

# AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING  
ENGINEERING • PRODUCTION • MANAGEMENT

DECEMBER 1, 1954

## In This Issue

- Freight Rate Adjustments in 1955 Car Prices
- Sectionized Automation on V-8 Block Line
- British Show Reflects Car Industry Expansion
- Self-Propelled Howitzer Production Highlights
- New Developments from Aircraft Hydraulic Meeting
- Machine Tool Automation for Pontiac V-8 Engine

COMPLETE TABLE OF CONTENTS, PAGE 3

A CHILTON PUBLICATION

# How a little talk (with the right person)



The "right person" was E. F. Aschemeyer, at left, Standard Oil lubrication specialist. His practical experience and training helped Elkin solve their problem.

## stopped a lot of chattering

Chattering and scoring of ways was causing trouble for the Elkin Tool and Manufacturing Company of Detroit. The trouble was noted on a big planer operating under extremely heavy loads. A Standard Oil lubrication specialist recommended the use of STANWAY #95, a very stable oil having extreme oiliness and containing a tackiness agent. Result: smooth operation, complete elimination of chattering and scoring.

STANWAY Industrial Oils were developed to meet the extreme oiliness requirements of certain machine tools which customarily operate under very heavy loads. STANWAY Oils are part of a complete line of industrial oils, cutting oils and coolants that serve all industry.

No matter how "special" your problem may be, there's a Standard Oil product to solve it. There's also a near-at-hand Standard Oil lubrication specialist to help you select and apply the right one. To obtain his services call the Standard Oil office nearest you, or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.



**STANDARD OIL COMPANY**  
*(Indiana)*

**STANWAY  
INDUSTRIAL  
OILS**

**On big equipment...  
to balance high engine speeds—**



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Reducing high auxiliary engine speeds to those best suited for snow plows is a typical Cotta job. Why? First . . . because Cotta heavy-duty Reduction Units are low in cost, ordered in large or small quantity lots. Second . . . maintenance is low, too, because they're built to withstand heavy, intermittent shock loads . . . give dependable performance on grueling, 'round-the-clock work schedules — indoors or out. And third . . .

because Cotta Reduction Units are precision-engineered and skillfully assembled by specialists with long experience and *know-how* in heavy-duty power transmission work.

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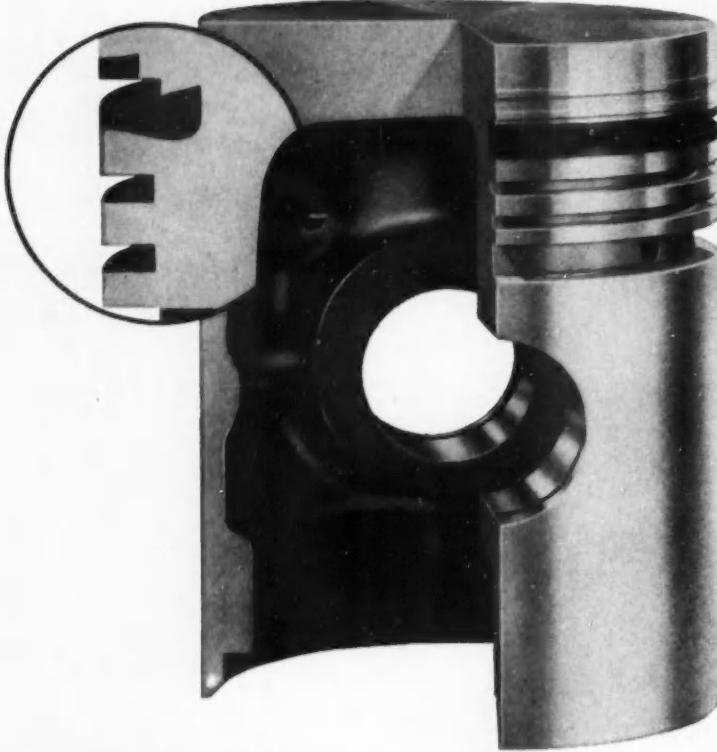
Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today.

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**HEAVY-DUTY**  
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**Zollner reports  
5 times more mileage  
is typical  
with top ring sections of  
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permanently by both the Al-Fin process and the exclusive Zollner mechanical lock . . . to make separation impossible. Mileage between overhauls is greatly increased due to control of wear, burning and erosion in the ring area. This BOND-O-LOC piston was developed by Zollner Machine Works, Fort Wayne, Indiana.

**"Extra Heavy Duty"** accurately describes the service for which Zollner designed this piston . . .

*Because Ni-Resist® eliminates wear troubles in the top ring groove.*

Records prove that gasoline or Diesel engines which use aluminum alloy pistons with top ring bands of Ni-Resist, show a step-up in power and greatly improved piston life, as well as lower maintenance. The reason for this is clear.

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No other cast metal provides such a useful combination of engineering properties . . .

Several types of Ni-Resist are available to meet a variety of industrial demands. Get full information . . . mail the coupon now.

**THE INTERNATIONAL NICKEL COMPANY, INC.**

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NEW YORK 5, N.Y.

A CHILTON MAGAZINE



PUBLISHED SEMI-MONTHLY

# AUTOMOTIVE INDUSTRIES

DECEMBER 1, 1954

VOL. III, NO. 11

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## FEATURES

Sectionized Automation in Transfer Machine....	48	Special Equipment for Self-Propelled Howitzer....	64
50 Million Vehicles Since 1908. By Ed. Janicki....	50	Future Designs as Foreseen by Body Engineers....	67
Aircraft Hydraulic Conference Discloses New Developments. By Joseph Geschelin.....	53	Proper Foundry Practices for Alloy Castings....	68
AGMA Semi-Annual Meeting. By Thomas Mac New	54	Huge Forging Press Nears Completion.....	69
Machine Tool Automation for Pontiac V-8 Engine Production. By Thomas Mac New.....	56	British Motor Show. By W. F. Bradley.....	70
Development of New Sealed Beam Headlamps....	61	Engine Designers Concentrate on Torque With Greater Displacement. By Joseph Geschelin....	92
How Freight Rate Adjustments Affect 1955 New Car Prices. By Leonard Westrate.....	62	Union Contract Demands. By Leonard Westrate...102	

## NEWS PREVIEWS

Federal Truck to Make Heavy-Duty Units Only....	33	High Spots of This Issue.....	31
New Defense Contracts Valued at \$700 Million....	33	News of the Automotive and Aviation Industries..	33
AMC Counting on Rambler to Up Sales Volume..	34	Men in the News.....	40
Third-Quarter Loss Reduces Chrysler Net.....	34	Machinery News. By Thomas Mac New..	79
Kaiser Moving Detroit Operations to Toledo.....	35	New Plant and Production Equipment.....	81
Willys Workers Get Bonus for Taking Pay Cuts...	35	New Products .....	88
Oldsmobile Out to Set New Production Records..	36	Free Literature and Free Information Service...	89
Car Output in High Gear in 1954 Closing Months	36	New Products for Aircraft.....	94
Chrysler Push for Sales Biggest in History.....	36	Metals. By William F. Boericke.....	96
AMA Urges U. S. to Assume Prime Road Costs....	37	On Our Washington Wire.....	124
AMC Acquires "Mighty Mite" Vehicle Rights....	38	Shorties .....	128
Studebaker-Packard Gets Gas Turbine Contract..	39	Calendar of Coming Events.....	129

Business Department Staff..... 31

Chilton Officers and Directors .....

Advertisers' Index .....

## DEPARTMENTS

High Spots of This Issue.....	31
News of the Automotive and Aviation Industries..	33
Men in the News.....	40
Machinery News. By Thomas Mac New..	79
New Plant and Production Equipment.....	81
New Products .....	88
Free Literature and Free Information Service...	89
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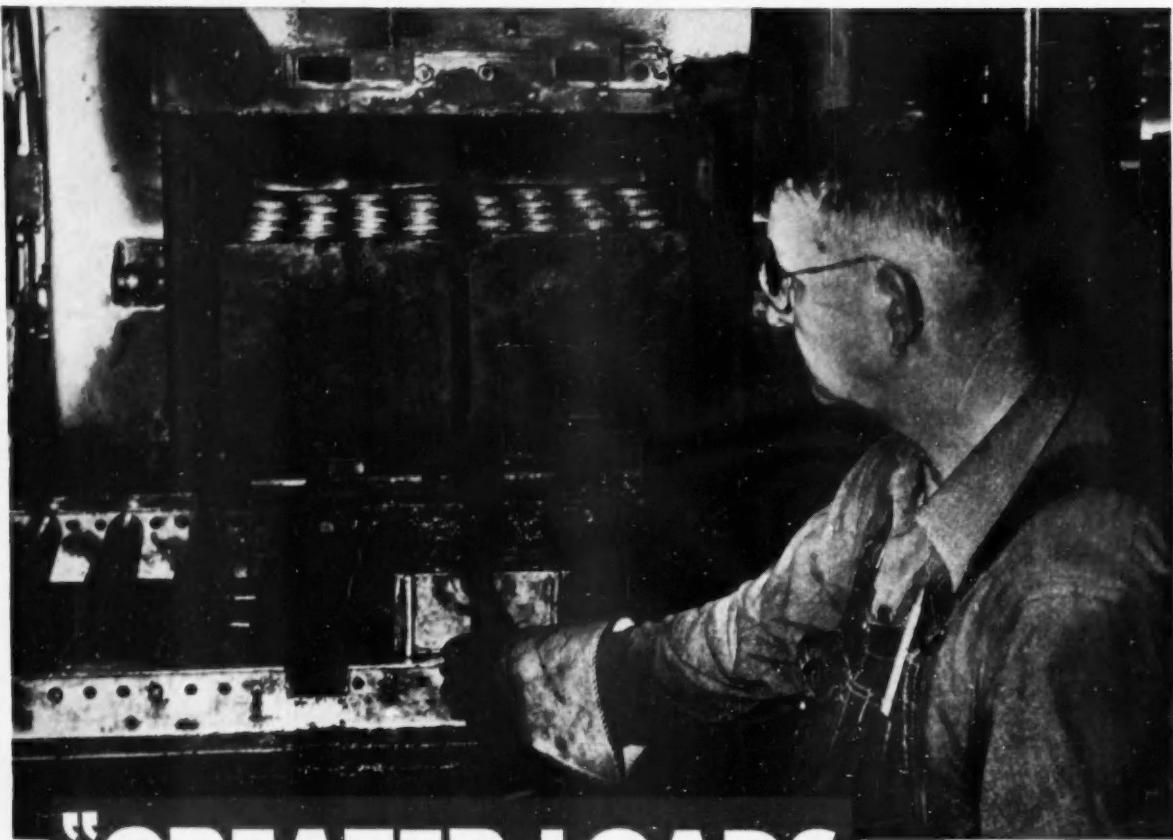
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# "GREATER LOADS ... MINIMUM DISTORTION"

Warner Gear Division,  
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Muncie, Indiana,  
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Marquenching Oil

**WARNER GEAR** notes great improvement in quenching results since Texaco Marquenching Oil was introduced.

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Other companies are getting similar results with Texaco Marquenching Oil. Users say it assures them the desired microstructure, reduces distortion and gives uniform hardness—all

at a lower cost. Texaco Marquenching Oil is made especially for this service. It has outstanding oxidation-resistance, is always uniform in quality, and has a high flash point.

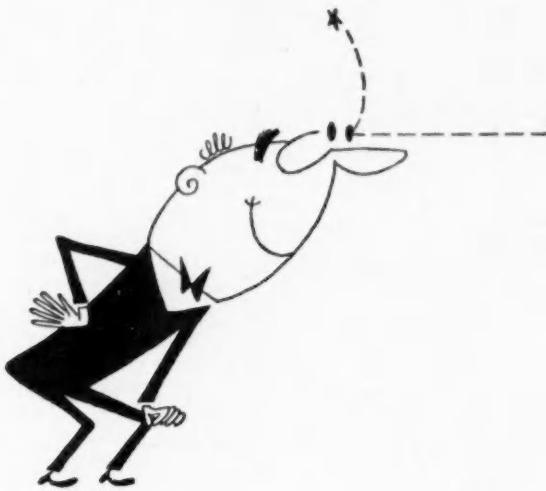
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# "Nothing can go wrong with Roto-Lock performance"

Says Elgin Metal Casket Company



Roto-Lock operation is simple: Serrated, tapered cam engages latch — draws panels tightly together when turned by crank or other hand tool.

Simmons Roto-Lock Fasteners are used by Elgin Metal Casket Co., of Elgin, Illinois, to give its Permaseal Caskets a perfect hermetic seal against air and water. Drawn down with a pressure of up to 1500 lbs., Roto-Lock guarantees an absolutely tight seal and strength far beyond requirements.

President E. B. Stewart of Elgin says: "Roto-Lock worked out particularly well because of the simplicity of its construction, and the fact that it was a lock already in a housing which could readily be sealed. Functionally the lock is very good since it pulls the lid down with ease and is a quick-operating mechanism. In other words, *the locking and sealing operation can be accomplished quickly and easily in a matter of seconds*. Since the whole locking and sealing mechanism contains only one moving part, *there is nothing that can go wrong with the performance of the lock*. Of course, this is important since mal-function at a funeral service would be a serious matter."

## and there's a Roto-Lock application to improve your product

Roto-Lock, which makes butt or right-angle joints quickly, is finding wide application in portable shelters, air freight and cold storage shipping containers, walk-in coolers, demountable furniture and scaffolding. It fastens in any misaligned or semi-open position and recesses completely into panels. *Wherever demountability is important, there's a Roto-Lock application.*

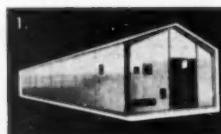
Write today for our 36-page catalog. It's filled with applications of Roto-Lock and Simmons' four other special fasteners engineered to improve products and reduce assembly costs.

**SIMMONS FASTENER CORPORATION**  
1749 N. Broadway, Albany 1, New York

# Simmons

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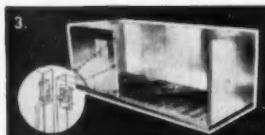
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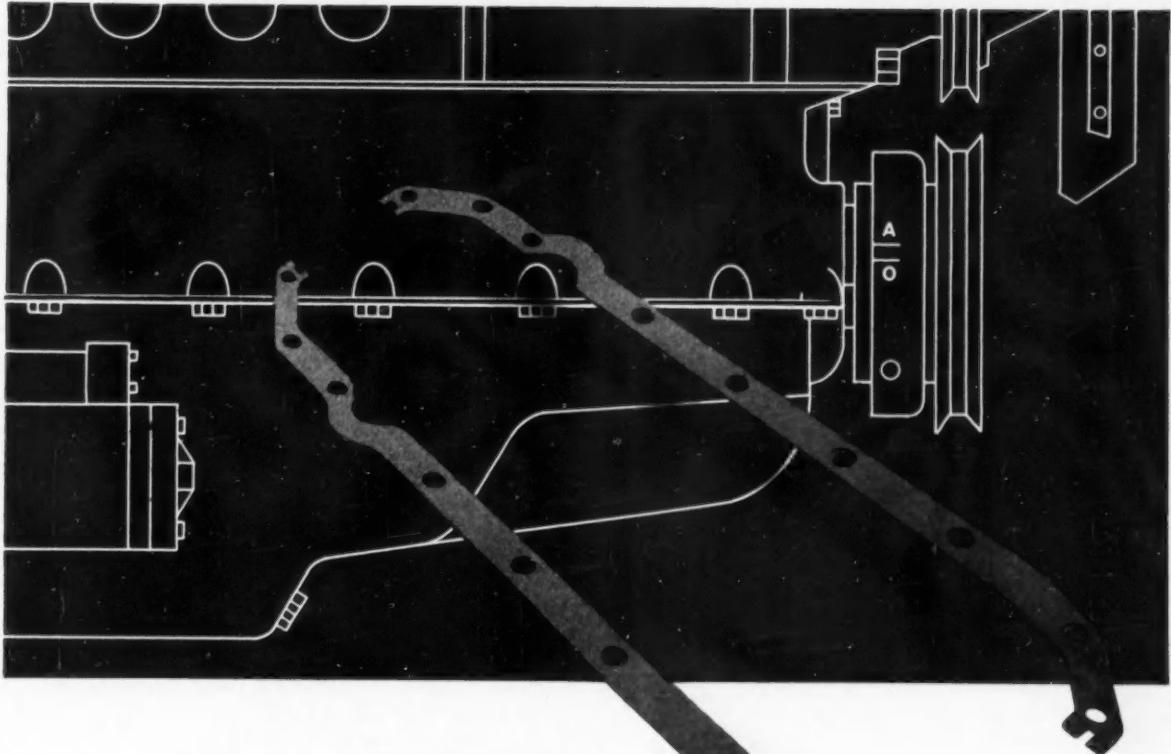


Some applications of Roto-Lock:



1. Portable Shelter
2. Partition
3. Demountable Refrigerator Unit
4. Demountable Desk





## improved fiber gasket

**stops leaks at oil pan shaft seal, cuts costs**

When two different sealing materials are used in a single application, the limitations of one material may lessen the effectiveness of the other.

This happened when a soft gasket material and a molded rubber shaft seal were used together on an automobile oil pan. The soft gasket between the pan and block yielded easily to the normal 30-40 ft.-lb. bolt torque. This put excessive flange pressure on the rubber seal and caused it to deform and leak.

A long road test proved that leaks could be stopped by using a pan gasket made from an improved fiber material—Armstrong CS-301 Accopac®. Accopac had sufficient compressibility to take up irregularities in the stamped flange, but was still dense enough to prevent excessive pressure on the shaft seal. Furthermore, Accopac was less expensive than any other material tested for the job.

Accopac's suitability in a wide variety of appli-

cations results from its unique combination of cellulose fiber, cork, and non-extractable latex binder. Each fiber is coated with latex before the sheets are made. The finished material is uniform, compressible, and dimensionally stable.

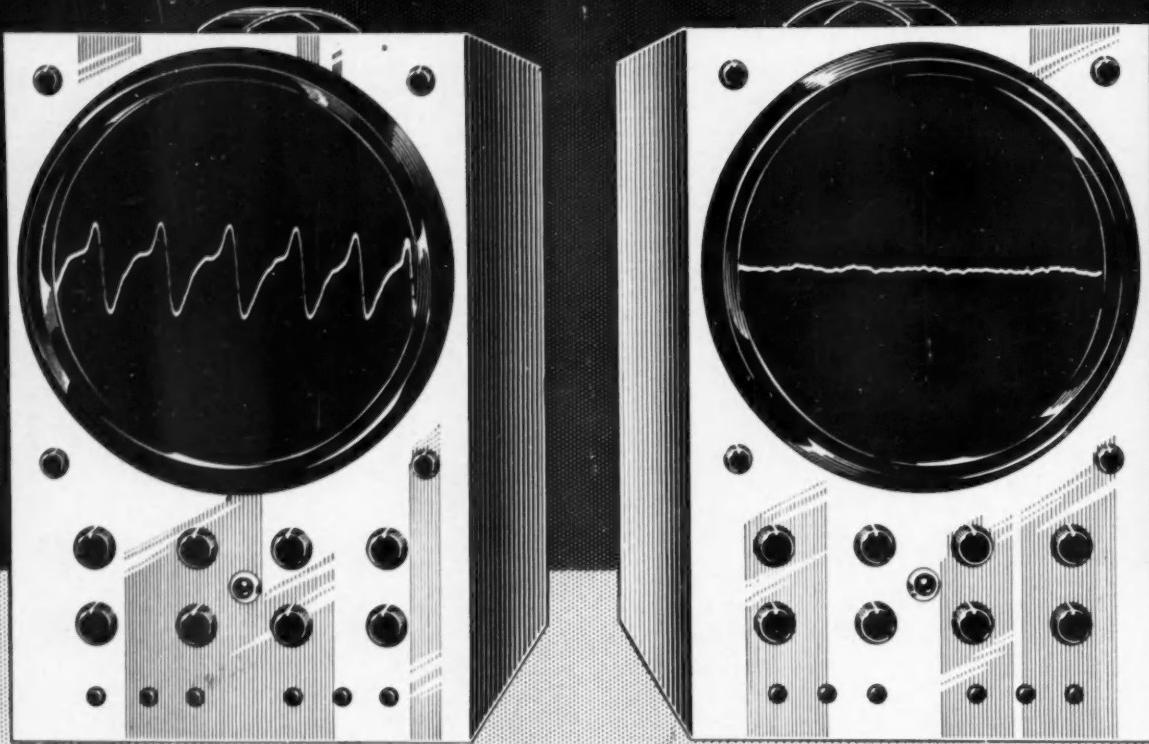
Where can you use Accopac? Use it wherever you need extra dependability in a low-cost gasket material. Though still new, Accopac already is widely accepted for sealing in pumps, engines, aircraft devices, automotive equipment, and appliances.

**FREE 24-PAGE GASKET MANUAL**—Look for "Armstrong's Gasket Materials" in Sweet's product design file . . . or write for your personal copy to Armstrong Cork Company, Industrial Div., 7012 Imperial Avenue, Lancaster, Pennsylvania. And be sure to specify **Armstrong Gasket Materials** when you order from your gasket fabricator.

---

**Armstrong Accopac**

---



**WHEN A STRAIGHT MINERAL OIL** was used to lubricate the ways, an 0.0008" jump at frequency of 2.74 cycles per second was noted.

**WHEN SUNOCO WAY LUBRICANT** was used on the ways, the jump was too small to measure, proof that this medium stops slip-stick motion.

# TEST PROVES SUNOCO WAY LUBRICANT ENDS SLIP-STICK TABLE MOTION

How effectively Sunoco Way Lubricant stops slip-stick table motion is graphically illustrated by these oscillosograms. The pattern on the left was made with a straight mineral oil as the lubricant; the other was made with Sunoco Way Lubricant on the ways. Both patterns are magnifications of changes in rate of table travel

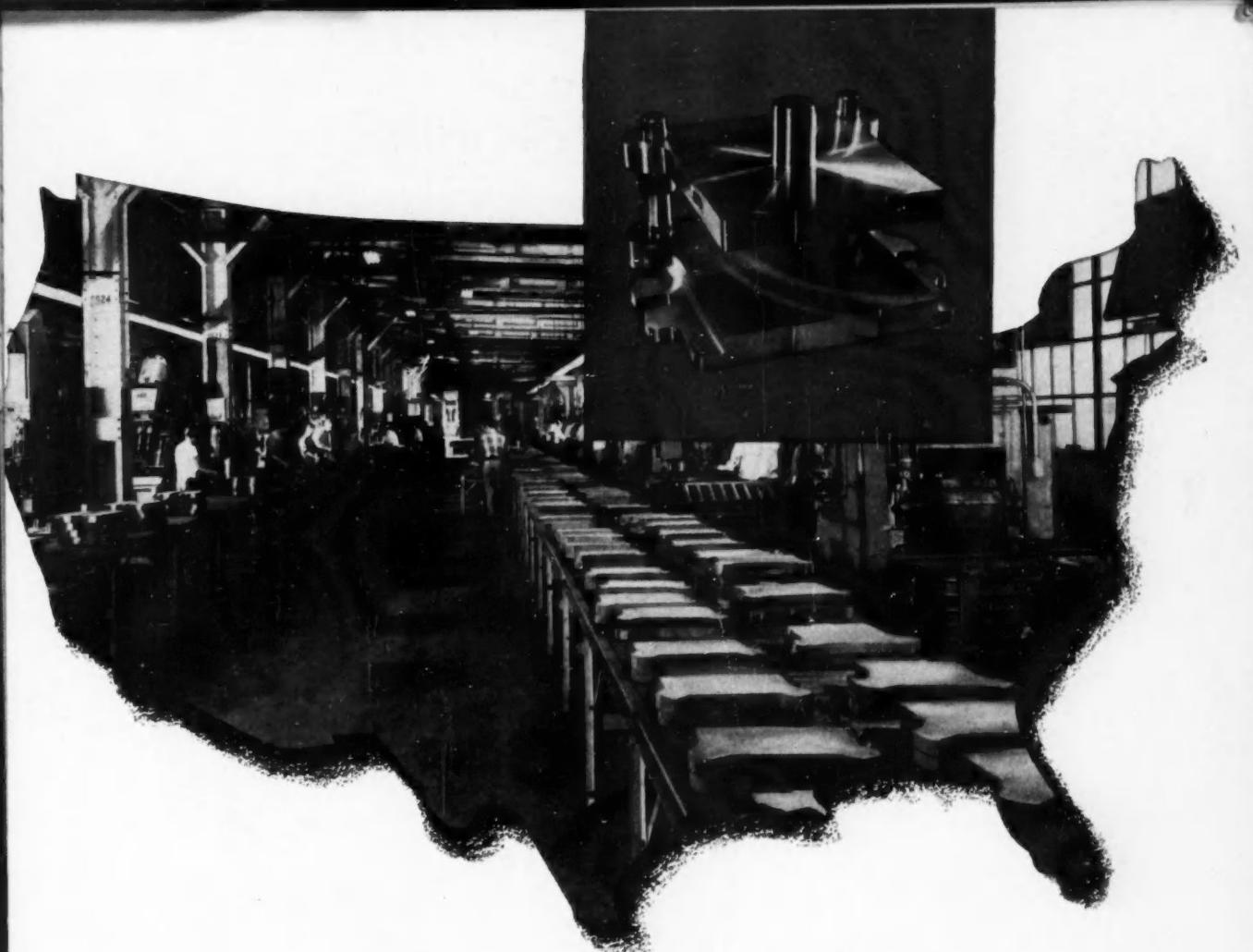
and were obtained under identical conditions.

You can stop slip-stick table motion, protect the ways, get better surface finishes, cut production losses with Sunoco Way Lubricant. Try it in your shop. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AA-12.

**INDUSTRIAL PRODUCTS DEPARTMENT  
SUN OIL COMPANY**



PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL  
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## *Here's the "how" of the fastest Die Set Service ever*



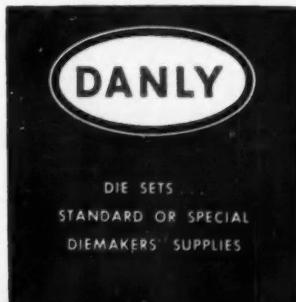
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**FIRST**, Danly is able to apply mass-production efficiency in manufacturing high precision, *interchangeable* die set components to the traditional Danly quality standards. **SECOND**, each Danly Branch is stocked with thousands of these *interchangeable* die set components, for immediate assembly to meet your tooling requirements. **THIRD**, Danly Branches are strategically located throughout the United States in major toolmaking centers to give you quick, local delivery. So, when you want the finest die sets in the shortest time . . . just call your nearby Danly Branch.

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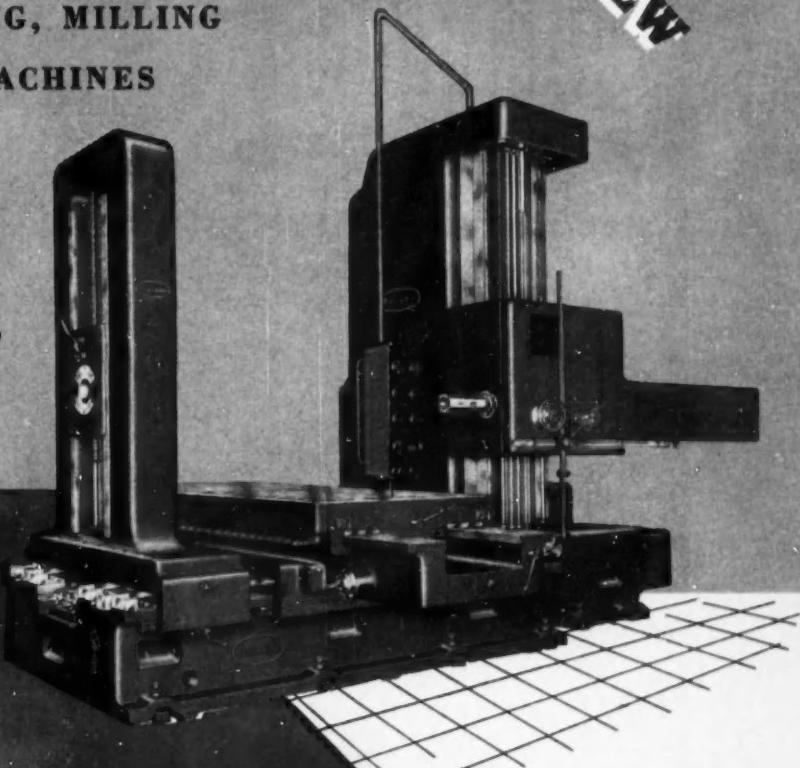
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### *Model 75*

with improved features  
for increased production  
and efficiency, ease of  
operation and maintenance,  
greater rigidity, flexibility  
and capacity.



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**OPTICAL MEASURING EQUIPMENT**  
for head and table (optional).

Available in 3, 4 and 5 inch spindle sizes, the Bullard Horizontal Boring, Milling and Drilling Machine, Model 75, is engineered to meet industry's present-day and future production requirements as it embodies the most modern machine design principles and techniques.

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for your copy of the new catalog.

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Please send me a copy of the new Bullard Horizontal Boring,  
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ADDRESS.....

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## 350 Foot

### Automation Line

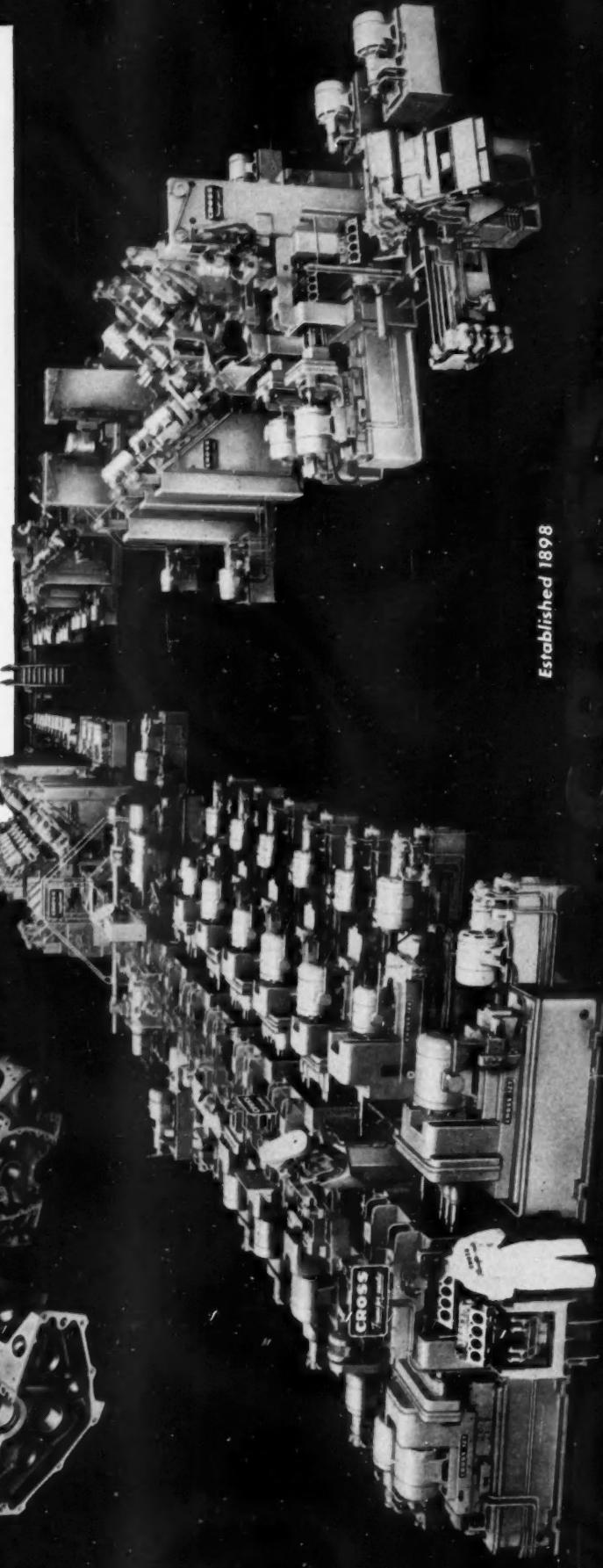
#### Performs 555 Operations on V-8 Cylinder Blocks



- ★ 100 pieces at 100% efficiency.
- ★ Operations: 265 drilling, 6 milling, 21 boring, 56 reaming, 101 countersinking, 106 tapping, and 133 inspection.
- ★ 104 stations: 1 for leading, 53 for machining, 7 for part handling, 6 for mechanical inspection, 36 for visual inspection, 1 for unloading.
- ★ 5 independent machine sections with provision for banking parts between each section; master automatic cycle for operating all 5 sections simultaneously.
- ★ Capacity for removing work piece at every station.

*Another Transfer-matic by Cross*

- ★ Automatic independent transfer mechanism for each machine section and automation units for handling parts from machine section to machine section.
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- ★ Pre-set tooling throughout.
- ★ Other features: Coolant system for tapping section, complete interchangeability of all standard and special parts for easy maintenance, construction to J.I.C. standards, hardened and ground ways, hydraulic feed and rapid traverse, automatic lubrication, automatic chip disposal.



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THE

DETROIT 7, MICHIGAN

CO.  
*Special MACHINE TOOLS*

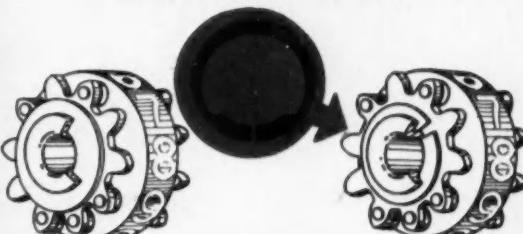
# Waldes Truarc rings replace old-fashioned fasteners... save assembly time...end scrap loss...increase operating efficiency

This is the Monroe Calculator



...precision-engineered business machine made even more efficient, and less costly to manufacture through the use of Waldes Truarc Retaining Rings.

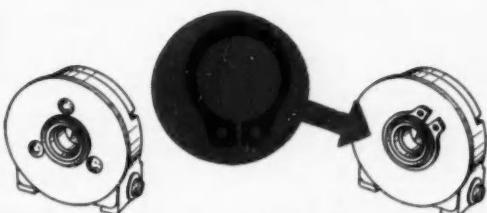
Multiplier Dial Assembly



**Old Way.** One-piece assembly was spun together. Spinning operation was costly, resulted in high scrap loss.

**Truarc Way.** Two-piece assembly is held together by one Truarc Ring (series 5108). Rejects: practically zero.

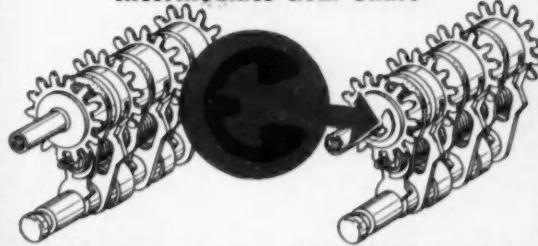
Electric Motor Governor



**Old Way.** Collector Disc assembly was formerly riveted, requiring skilled labor. Riveted Collector Disc could not be removed in the field.

**Truarc Way.** Truarc Ring (series 5100) replaces rivets, saves labor, material...improves Collector action. Collector Disc is easily replaced.

Intermediate Gear Shaft



**Old Way.** Washer riveted on end of assembly for zoning control. Costly, troublesome, hard to obtain critical zoning required.

**Truarc Way.** Truarc E-Ring (series 5133) cuts assembly time, virtually eliminates rejects and final assembly and zoning problems.

Monroe Calculating Machine Company, Orange, N. J. uses various types and sizes of Waldes Truarc Retaining Rings. Use of Truarc has helped eliminate scrap losses, saved on material and labor, and resulted in increased operating and servicing efficiency of the product. Monroe plans to use Truarc Rings for every possible fastening operation on their entire line!

You, too, can save money with Truarc Rings. Wherever

ever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better, more economical job. Waldes Truarc Rings are precision-engineered...quick and easy to assemble and disassemble.

Find out what Waldes Truarc Retaining Rings can do for you. Send your blueprints to Waldes Truarc Engineers for individual attention, without obligation.

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AY126

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Please send me the new Waldes Truarc Retaining Ring catalog.

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.....

Title .....  
.....

Company .....  
.....

Business Address .....  
.....

City ..... Zone ..... State .....



# 70 SIZES

## of MALLORY Silver Rivet Contacts Stocked for Immediate Delivery

If you use fine-silver headed rivet contacts, you can save the time of designing, tooling and producing "specials", by ordering from Mallory's standard stock list. Many manufacturers have already found this a time-saving, economical way to obtain contacts in production lots, for experimental use, and for pilot runs or job orders.

The 70 different contacts that Mallory carries in stock—ready for immediate shipment—represent the types and sizes most commonly used in thousands of existing applications. Included are both flat and radius-faced designs.

For the new equipment you may be designing, it will pay you to use Mallory standard rivets as a "preferred list" that will assure you prompt delivery when you go into either pilot or full-scale production. It will pay you, too, to check through this standard list for sizes applicable to the equipment which you are now manufacturing. You will probably find a standard size that is readily applicable to a contact you may now be ordering on a special basis.

Our new folder 3-13A lists complete dimensions, part numbers and prices of Mallory standard stock silver rivet contacts. Write for your copy today.

### FOR UNUSUAL REQUIREMENTS

When design requirements call for a contact not included in the standard stock program, Mallory engineers will be glad to lend expert assistance in recommending special designs . . . and to manufacture contacts or complete contact assemblies in our efficient production facilities.

#### Serving Industry with These Products:

Electromechanical—Resistors • Switches • Television Tuners • Vibrators  
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Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

*Expect more...  
Get more from* **MALLORY**





*- and neither are*  
**DAVENPORTS  
 ON WHEELS!**

If today's automotive seating were as advanced as other features, your interiors could be *roomier*, safer, more modern—and have the superior sales-pull of today's best exterior styling.

Then why bulky construction that robs you of room—that would be more in place in Grandma's parlor?

You know the answer. Upholstering is still too dependent on old methods and materials to be in step with the rest of your operation.

But it needn't be for long. Designers are discovering, in AIRFOAM, a brand-new kind of cushioning that

unlocks the door to a brand-new Science of Seating. Brand-new conceptions—with cushions and frame all-one—to replace unneeded bulk with bountiful, comfortable, new *roominess*!

And their truly modern, custom-look will be mass-produced at corresponding savings!

AIRFOAM development engineers, working with leading automotive designers, are making giant strides, right NOW. For information and assistance write—

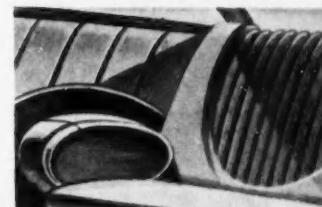
Goodyear, Automotive Products Dept., Akron 16, Ohio.



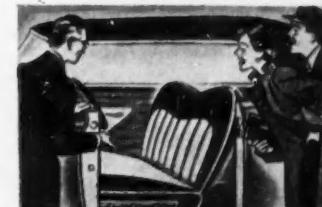
AIRFOAM makes interiors roomier, more luxurious!



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AIRFOAM gives custom looks at competitive prices!



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**Airfoam**   
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 THE WORLD'S FINEST, MOST MODERN, CUSHIONING

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## FOREMOST IN SCIENTIFIC DEVELOPMENT

IN THE REALM OF FORGING DESIGN AND THE DEVELOPMENT OF PROPER GRAIN-FLOW, WYMAN-GORDON HAS ORIGINATED MANY FORGING DESIGNS WHICH AT THE TIME OF THEIR DEVELOPMENT WERE CONSIDERED IMPOSSIBLE TO PRODUCE BY FORGING.

# WYMAN-GORDON

Established 1883

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# Power Steering for Tractors



## EATON ROTOR PUMPS



In fifteen makes of motor cars, trucks, and tractors, Eaton Rotor Pumps with flow control are furnishing dependable hydraulic power for power steering. As a pioneer in this field, Eaton offers unequalled facilities in both design and production. If you are considering power steering, there are distinct advantages in allowing our engineers to work with yours in the early design stages.

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# LOOK TO THIS NEW, PRODUCTION-BOOSTING LINE



50 THROUGH 300-TON CAPACITIES.



America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

# For a realistic answer to the metal stamping and forming problems of today... and tomorrow

## DESIGN MODERNIZATION CONCEALS DRIVING MECHANISM

Fully streamlined, enclosed construction, front and back, provides pronounced advantages. There are no exposed, overhanging flywheel, clutch, brake, intermediate shaft, nor motor in rear of press to obstruct crane service, block light, throw grease and consume floor space unnecessarily . . . yet all parts are quickly accessible.

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## RUGGED, HEAVY DUTY FRAMES PROLONG DIE LIFE

All-steel, rigidly constructed frames, featuring an exclusive triple box section design, provide maximum resistance to deflection from horizontal, diagonal and torsional stresses. Greater accuracy and longer die life are thereby assured.

## GREAT SHUT HEIGHT AND LONG SLIDE ADJUSTMENT

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Hailed as the most progressive step in straight side, double crank press history, the new Niagara SC-2 Press Series could only have originated from a keen insight of today's metal working problems and the more challenging ones of tomorrow. In every detail of design, you'll recognize the unduplicated competence of Niagara engineers. Who else would be more mindful of press users' needs than the men who design and build America's leading and most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work?



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Preview this complete new line of straight side presses at once. Find out what they can do for you. Write for Niagara's new, illustrated Bulletin 64-H today.

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# NIAGARA

## STRAIGHT SIDE DOUBLE CRANK PRESSES

# ACCURATE



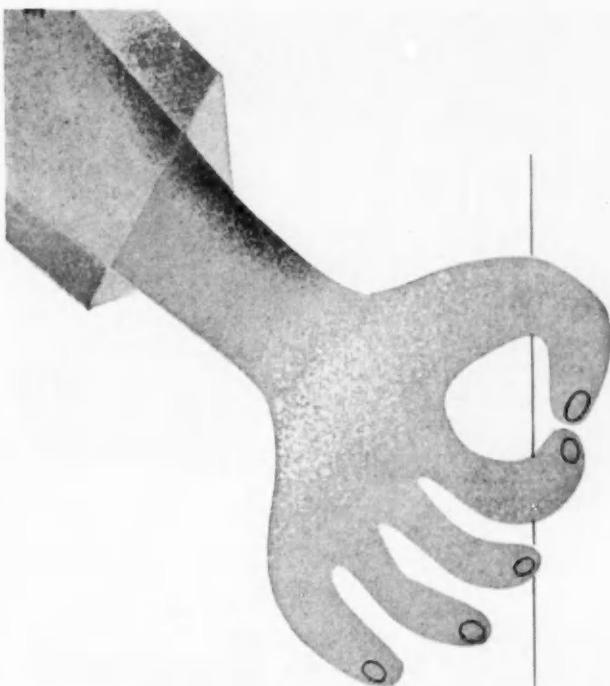
From the largest bomber to the smallest helicopter MECHANICS Roller Bearing UNIVERSAL JOINTS accuracy has met every aircraft need. Designs, metals, machining, tolerances, heat treating, hardening, balancing and lubrication—all have been specifically adapted for aircraft precision. Let MECHANICS universal joint engineers help

solve your control and power transmission problems. Our new catalog, containing helpful universal joint engineering data and tracing kits, will be sent to engineers, upon request.

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## MECHANICS *Roller Bearing* UNIVERSAL JOINTS

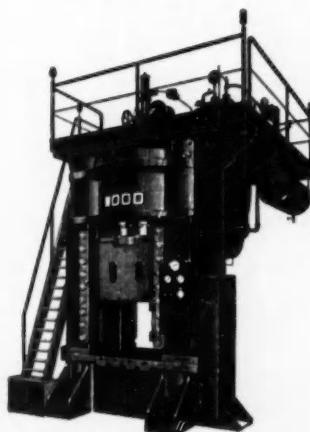
For Cars • Trucks • Tractors • Farm Implements • Road Machinery •  
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*Ever  
measure  
a pinch  
of  
salt?*

IN METALWORKING, THE PAYOFF'S AT AN R. D. WOOD PRESS LIKE THIS ONE!

This 2000-ton heavy duty, self-contained hydraulic forming press is used for continuous service on such operations as hot forging, forming, coining and forcing. R. D. Wood hydraulic presses are made in a full range of sizes and capacities, for many uses. Ask for catalog, and for engineering aid—both yours without obligation.



It is to be doubted whether even the most expert chef can tell the capacity of his own pinch of salt. And yet, he has a fine flair for flavor—an art which never fails him. On the other hand, in the business of making capital investment machinery such as hydraulic presses, R. D. Wood Company cannot use the pinch as a means of measurement. We have to rely on highly technical procedures. However, there is an art here which compares with the chef's. It's the art that comes only from having done the same thing many times before . . . sizing up a manufacturer's production need . . . building a press to meet that need . . . and doing the job so well that he never has the same problem again. We're holding an illustrated catalog for you. Please, send for it.



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FIRE HYDRANTS



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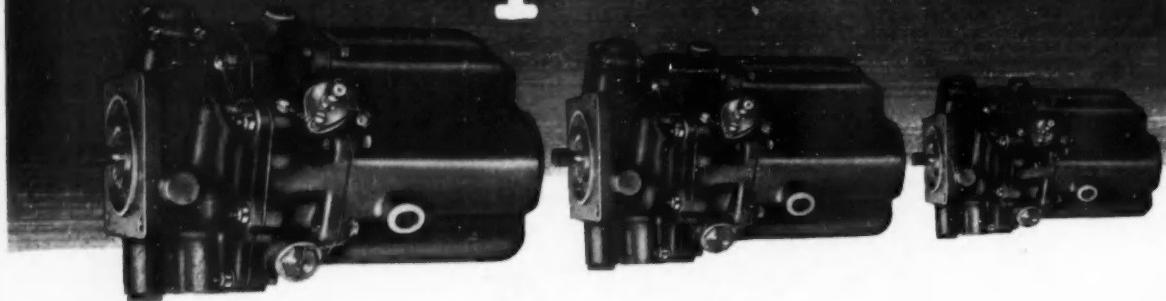


GAS PRODUCERS



ACCUMULATORS

"...produced



## 27,000 CECO Jet Engine

We are proud to have supplied more than 27,000 Main Fuel Controls for modern jet engines . . . installed in such strategic aircraft as the B-36, B-47, F-86 and FJ-2. This accomplishment is the result of forward-looking research and development by CECO's engineering-production teams' working hand-in-hand with designers and engineers of the aircraft industry.

*This proved talent can serve your company in your research and development program for the "flights of tomorrow." We invite your inquiries.*

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PUMPS • SERVOMECHANISMS • CARBURETORS • PROTEK-PLUGS

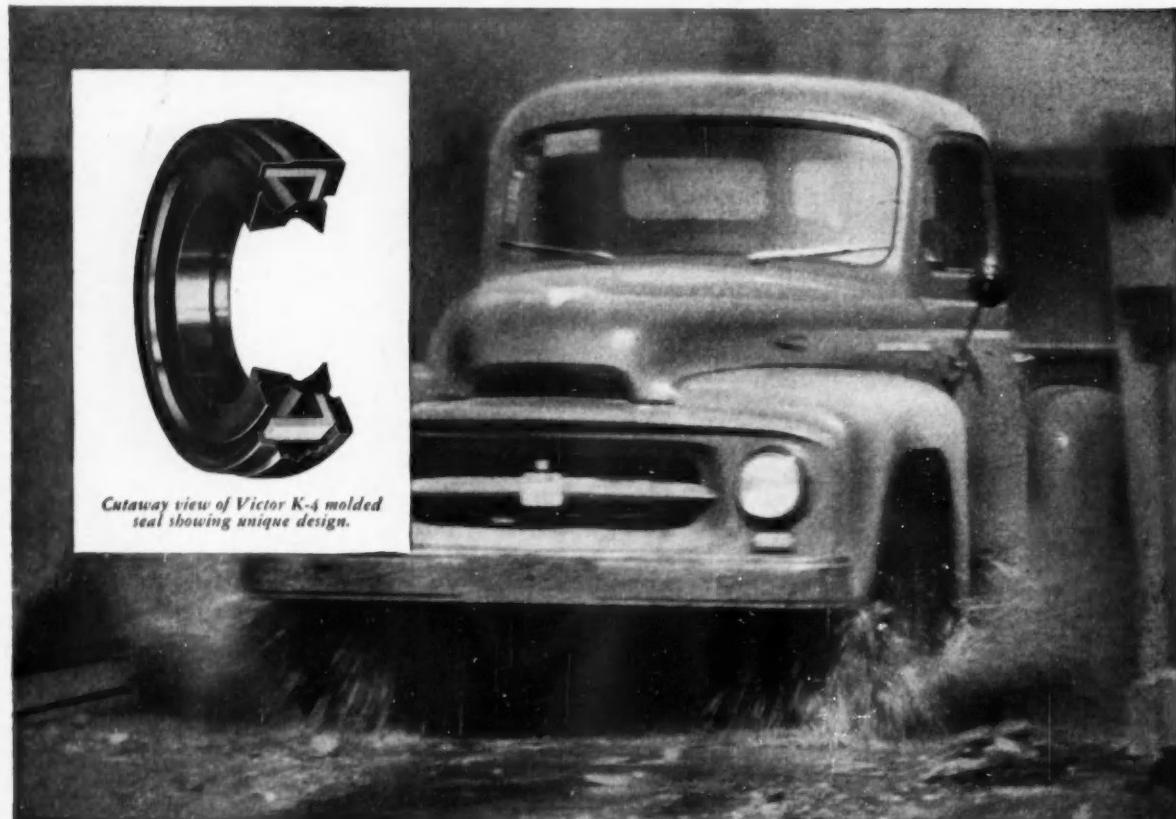


**to date..."**



*Another new development using*

# B. F. Goodrich Chemical *raw materials*



*Cutaway view of Victor K-4 molded seal showing unique design.*

*K-4 oil seals, made by Victor Manufacturing & Gasket Co., are installed on International Harvester trucks. B. F. Goodrich Chemical Company supplies only the Hycar rubber.*

## TRUCK SLOSHES THROUGH WATER SAFELY ...with Hycar bearing seals

THIS truck's front wheel bearings are fully protected from the water and dirt of this big puddle by seals made of Hycar rubber. And just as vital a function—the Hycar bearing seals keep grease in!

This double protection means double savings. These Victor seals made of Hycar assure the long life and efficiency of the wheel bearings. Costly repairs are eliminated because the bearings cannot run dry and foreign matter cannot score their highly polished surfaces.

Hycar rubber is used in many

sealing applications — for trucks, passenger cars, tractors and home appliances. Hycar is highly resistant to abrasion and maintains a tight seal under severe operating conditions and a wide temperature range.

Parts made of Hycar can be molded to close tolerances. And—Hycar's resistance to oil, grease and most chemicals makes it ideal for many uses in many industries.

Perhaps Hycar can solve a problem for you—do a job that you thought couldn't be done. We'll

help you find the answers—give you technical advice. For information, please write Dept. HG-6, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

**B. F. Goodrich Chemical Company**  
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**Hycar**  
*American Rubber*

**GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors**

WITH NATIONAL ACME

# thread rolling TOOLS and ROLLS

*these users get  
better threads, faster,  
... at reduced costs*

CASE STUDY A



Faster cycle time on the automatic machine setup was accomplished by using a National Acme "Fette" Thread Rolling head for threading this lock screw. Actual rolling time (10 seconds) was necessarily slow because the feed was controlled by other operations which put cycle time at 15 seconds. Former method took 29 seconds for the cycle which was controlled by the threading speed required.

CASE STUDY

(C)

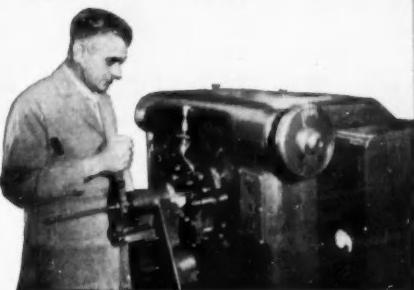


With a National Acme fixture to roll the thread behind a shoulder, all operations on this bicycle pedal hub were completed in one setup on the automatic — extra man-hours, handling, machine and floor space for the previously required second operation were eliminated. These rolling fixtures are made in single roll types as well.

CASE STUDY B



Better production with no trouble and at lower cost attests to the advantages of the National Acme TR-1 thread rolling machine for this long shaft job. The .521"-5 ball thread is rolled in 45 seconds for the 33" pieces. Adaptable for hand or magazine feed of small parts the hydraulically operated TR-1 machine utilizes National Acme rolls for threading, knurling, burnishing, etc. — two and three roll heads interchangeable.



There is no way you can thread a piece faster than by thread rolling . . . no better way to roll a thread than with National Acme thread rolling equipment.

And, whether your National Acme thread roller is the Fette Head, the Straddle-Type Fixture or the TR-1 Machine, **ALL** your rolled threads are more accurate, stronger and smoother when you use **GENUINE NATIONAL ACME THREAD ROLLS**—made only for National Acme Thread Rolling Tools.

Results like these are being shown every day by users of National Acme thread rolling equipment. Results that measure up to the tolerances and finish that your specs call for—at cost reductions that keep

you in the competitive market.

Literature on request, but why not ask for comparative figures on your jobs.

This emblem identifies quality rolls for your National Acme thread rolling equipment.



The NATIONAL  
ACME COMPANY

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ACME-GRIDLEY BAR and CHUCKING AUTOMATICS  
1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines •  
Automatic Threading Dies and Taps • Limit, Motor Starter and  
Control Station Switches • Solenoids • Contract Manufacturing

*plan on product beauty  
that lasts longer...*



## PLAN ON **ALUMINUM PARTS AND TRIM**

The aluminum parts and trim shown here are examples of how leading automobile companies are using aluminum in their distinctive designs. Aluminum, in either its natural finish or in a wide range of special finishes, is attractive and stays attractive. It also offers light weight with great strength; freedom from rust; ease of fabrication; low cost; plus other design and functional applications that would be impractical with other materials.

Reynolds Aluminum Specialists are always ready to help on your design and production problems. Reynolds fabricating facilities are also at your service. Call the Reynolds office listed under "Aluminum" in your classified telephone directory or write Reynolds Metals Company, 2587 South Third Street, Louisville 1, Kentucky.



See "Mister Peepers", starring Wally Cox, Sundays on NBC TV

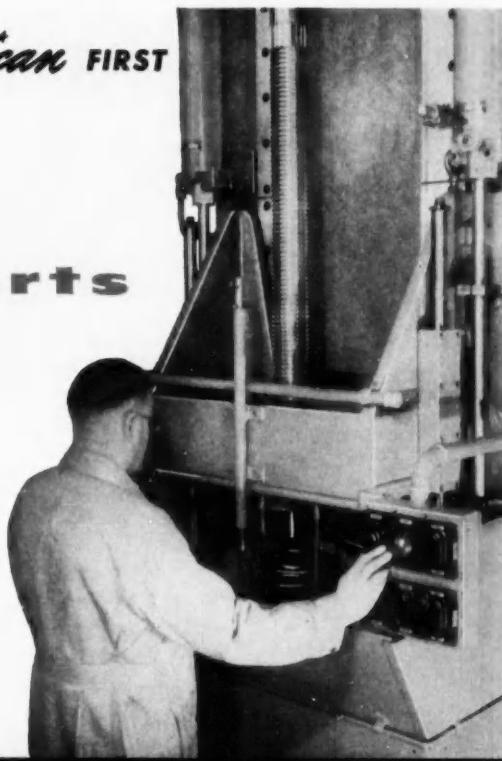
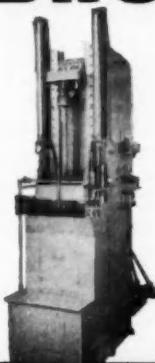
# REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND



**ANOTHER American FIRST**

**28 different  
diesel truck parts  
BROACHED on  
ONE  
MACHINE**



\*Machine utilizes three types of broaches—round, plain spline and combination round-and-spline.

\*Interchangeable thrust bushings which adapt to a universal equalizing fixture.

\*One to three station broaching depending on size and shape of part to be broached.



Here's an example of the flexibility of tooling American can build into a broaching machine to fill special requirements. Shown at left are some of the 28 different diesel truck parts a manufacturer is producing with the aid of an American vertical pull-up broaching machine. Note the variety in types of parts — broach lengths varied from 33 to 70 inches.

An added feature of this machine is a lower elevator follow-up during the first part of the broaching stroke providing greater back support and eliminating vibration.

Whether you need extreme versatility—with many parts broached by one machine, as in this example—or the high volume, low cost production resulting from completely automated broaching of single parts, American is prepared to serve you. American engineers and builds all three—broaching machines, broaches and broaching fixtures.

Let us work on your broaching problem.

Write for catalog 450—the new and informative manual on American broaches, machines and fixtures.



**American BROACH & MACHINE CO.**  
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.  
ANN ARBOR, MICHIGAN

See *American First* — for the Best in Broaching Tools, Broaching Machines, Special Machinery





**More and more automotive repair shops and industrial plants are turning to FLEXLOCS to reduce maintenance on high speed, vibrating equipment.**

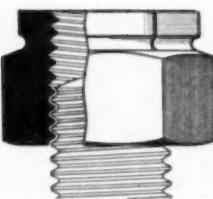
## FLEXLOC locknuts save \$600 per year in reconditioning automobile engines

By using FLEXLOCS on connecting rod bolts, a motor reconditioning shop cut assembly time by a minimum of 5 minutes per motor. This added up to a yearly saving of 250 hours or \$600. No drilling of bolts was needed . . . no adjusting of nuts to set cotter pins was required. And the FLEXLOCS assured a tighter assembly than was possible with the castellated nuts and cotter pins formerly used.

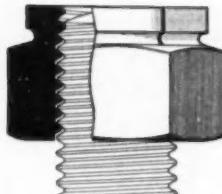
FLEXLOC locknuts reduce maintenance too. Once they are installed, you can forget them. Service and

inspection periods can be stretched safely from days to weeks. And FLEXLOCS are reusable. They can be applied again and again without losing locking efficiency.

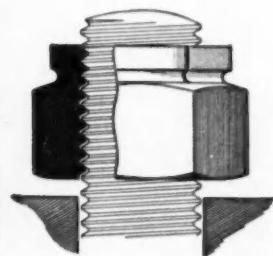
You can get FLEXLOC Self-Locking Nuts of various types and materials in a wide range of sizes and in any quantity. These one-piece, all-metal nuts are carried in stock by leading industrial distributors everywhere. Write for literature and samples for test purposes. STANDARD PRESSED STEEL Co., Jenkintown 53, Pa.



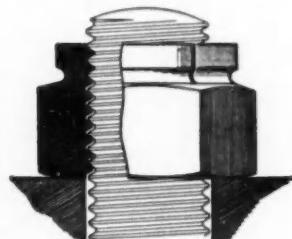
**Starting.** A FLEXLOC starts like any ordinary nut. Put it on with your fingers. Tighten it with a standard hand or speed wrench.



**Beginning to Lock.** As the bolt enters the segmented locking section, the section is expanded, and the nut starts to lock.



**Fully Locked As a Stop Nut.** When 1½ threads of a standard bolt are past the top of the nut, the FLEXLOC is fully locked. A FLEXLOC does not have to seat to lock.



**Fully Locked As a Seated Nut.** When it is used as a lock or stop nut, the locking threads of the FLEXLOC press inward against the bolt, lifting the nut upward and causing the remaining threads to bear against the lower surface of the bolt threads. Vibration will not loosen a FLEXLOC, yet there is no galling of threads.

**FLEXLOC**

LOCKNUT DIVISION

**SPS**

JENKINTOWN PENNSYLVANIA



## ENGINEERING COOPERATION AND DESIGN ASSISTANCE Bring You The Advantages Of Ball Bearings Like These

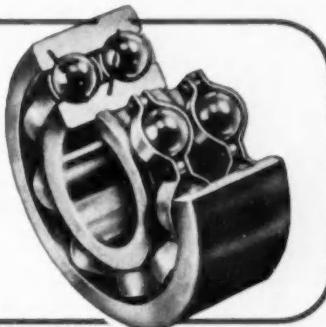


### BCA XLS BEARINGS for applications where space is limited

BCA XLS Bearings are especially useful where space is limited and where weight must be held to a minimum—these Conrad type bearings, made to inch boundary specifications, feature a smaller bearing section for a given shaft diameter. They are suitable for any combination of radial and thrust loads. BCA XLS Bearings are used in metal turning machines, earth-moving and other equipment.

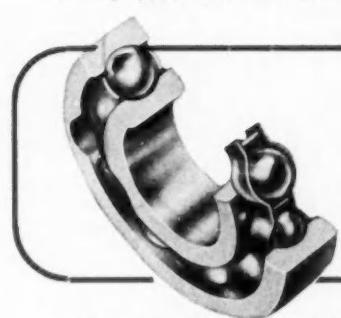
### BCA 5200 and 5300 SERIES bearings can carry any combination of radial and thrust loads

BCA 5200 and 5300 Series Bearings are double-row bearings of the angular contact, maximum capacity type. The maximum load-carrying capacity is the result of the larger ball size in BCA design. The vertex of the contact angle, between the balls and the raceways, falls within the bearing. This construction insures enough flexibility to compensate for mounting inaccuracies without sacrificing the rigidity required in many double-row bearing applications. These bearings can be furnished with shields and lock ring grooves.



### BCA 1200 and 1300 SERIES bearings for HEAVY loads

These BCA maximum capacity type bearings meet the heavy duty requirements of service in farm tractors, road machinery, power shovels, earth-moving equipment, and special materials-handling vehicles. Additional balls are introduced between the raceways thus increasing radial load carrying capacity to a maximum. BCA 1200 and 1300 Series Bearings are made to the same standard metric boundary dimensions as corresponding BCA Conrad type bearings.



### BCA ANGULAR CONTACT BEARINGS for maximum performance

BCA Angular Contact Bearings feature a sturdy, one-piece S-section retainer. There are no rivets to work loose, and the design of the retainer permits construction that is fully angular-contact on both outer and inner rings. Low, medium, and high angles of contact are available in both light and medium series bearings. These BCA Bearings have the ability to carry any combination of radial and thrust loads. Thrust loads are taken in one direction only.



### BCA AGRICULTURAL BEARINGS save installation and service time

BCA engineers, working with manufacturers of farm equipment, have developed a line of low-cost bearings—pre-lubricated package units—designed to save installation time for the equipment manufacturer and service time for the farmer. BCA Cam Follower Bearings, Wheel Bearings, Idler Pulley Assemblies, Flange Bearings, and Hay Rake Bearings already have been proved in use in the equipment of many leading manufacturers.

BCA engineering cooperation and design assistance are available to help solve your problems involving ball bearings.



radial, thrust, angular-contact Ball Bearings

**BEARINGS COMPANY OF AMERICA**  
DIVISION OF FEDERAL-MOGUL CORPORATION  
**LANCASTER • PENNSYLVANIA**



# Bendix POWER

**STEERING AND BRAKING**

*sets new standards  
of driving ease  
and safety*

Today's most wanted power features for cars and trucks

## **Bendix**\* low pedal POWER brake

Specified by more car manufacturers than any other make, Bendix Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from stop-and-go controls. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety!

## **Bendix**\* POWER steering

Because Bendix Power Steering is of the linkage type, vehicle manufacturers find it especially adaptable for production line installation, without extensive engineering changes. Manufacturers can now meet the increasing demand for power steering more efficiently and more economically with Bendix Power Steering.

## **Bendix** HYDROVAC\* POWER brake

With over four million in use, the Bendix Hydrovac is by all odds the world's most widely used power brake for commercial vehicles. This overwhelming preference for Hydrovac is a result of sound engineering design, exceptional performance, low original cost and minimum service upkeep.

## **Bendix** AIR-PAK\* POWER brake

With one simple compact unit, Bendix Air-Pak combines all of the well-proven advantages of hydraulic brake actuation with an air brake system. An important advantage of Air-Pak is that brakes can be applied by foot power alone when braking is required before air pressure builds up or if it should fail for any reason.

\*REG. U.S. PAT. OFF.

Prospects are easier to sell and owners are better satisfied with cars equipped with Bendix power steering and braking.

For example, the Bendix Low Pedal Power Brake is by all odds the most popular and best proven power brake offered by any passenger car manufacturer today, and vehicle manufacturers can quickly and economically adapt the popular Bendix Power Steering to their present

design without extensive engineering changes.

For truck manufacturers and operators, Bendix Hydrovac and Air-Pak have long been overwhelming favorites in the field of power braking for commercial vehicles.

That's why if you build, buy or sell passenger cars or trucks, it will pay to make sure they are equipped with Bendix power braking and steering.

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## High Spots of This Issue

### ★ 50 Million Vehicles Since 1908

The date Nov. 23 was an epic one in the history of General Motors Corp. On that day the corporation turned out its 50 millionth vehicle with appropriate ceremonies. The pages of time are turned back here to the years preceding. Page 50.



### Gear Cutting and Measuring Topics at AGMA Meeting

Executives from all parts of the country turned out in record-breaking numbers for the recent semi-annual meeting of the American Gear Manufacturers Association in the Windy City. Several of the important talks are reviewed here. Page 54.



### Machine Tool Automation for Pontiac V-8 Engines

The vast number of automation devices and machine tools used to produce the new Pontiac V-8 engine represent an investment of millions of dollars. The author takes the reader on a guided tour of the lines and explains their operations. Page 56.



### Special Equipment for Making Self-Propelled Howitzer

Production of the Army's M-44 self-propelled 155 mm howitzer, currently being made by Massey-Harris-Ferguson, requires an interesting array of special equipment. This discussion highlights operations on the hull and other components. Page 64.



### British Show Reflects Automobile Industry Expansion

The recent 39th International Motor Show at Earls Court, London, indicated clearly the prosperity and growth of the British automobile industry. A total of 66 car makers presented 280 automobiles, and the booth total was 538. Page 70.



### 33 New Product Items

#### And Other High Spots, Such As:

Sectionized automation applied to huge transfer machine; aircraft hydraulic conference; development of new sealed beam headlamps; how freight rate adjustments affect 1955 new car prices; future designs as foreseen by body engineers; proper foundry practices for stainless alloy castings; huge forging press; and union demands on automobile industry.

**Automotive and Aviation News, Page 33**

**Complete Table of Contents, Page 3**

AUTOMOTIVE INDUSTRIES COVERS  
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES  
• BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY  
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT  
ENGINEERING • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT  
PRODUCTION • MANAGEMENT

**Everyone is talking about**

**the NEW**

**CINCINNATI TOOLMASTER  
MILLING MACHINE**



Style 1B Toolmaster Milling Machine. Equipped with 1 hp spindle head; collet chuck type spindle nose, capacity  $\frac{1}{8}$ " to 1" shank cutters; power feed to quill; worm positioning of swivel head.



Style 1B Toolmaster Milling Machine. Cincinnati rectangular overarm, square gibbed saddle-knee bearing, extra wide knee bearing on column face . . . these and other features constitute exceptionally sturdy construction for maximum hp cuts.

Meet the newest member of Cincinnati Milling's extensive line of machine tools . . . the Toolmaster. There are three styles of these sturdy toolroom milling machines:

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Toolmaster Milling Machines constitute a new opportunity to reduce costs in shops of all sizes; in toolrooms, metal pattern shops, contract machine shops, tool and die shops. You can depend upon any machine tool bearing the name plate of The Cincinnati Milling Machine Co. Would you like to know more about this new Toolmaster? Write for new four-color catalog, No. M-1870.

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Style 1C Toolmaster Milling Machine. Equipped with 2 hp heavy duty spindle head; built-in motor; 8 spindle speeds; No. 40 standard spindle nose.



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MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING  
MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES  
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 111, No 11

December 1, 1954

## Kolcast Industries Now A Thompson Subsidiary

Thompson Products, Inc., has arranged to acquire Kolcast Industries, Inc., Cleveland, O., as a wholly-owned subsidiary. The transaction was brought about through an exchange of stock.

Kolcast produces frozen mercury castings, particularly large castings for jet aircraft engines. Thompson has pioneered in the investment casting field, concentrating on small, precision castings made by the frozen mercury process.

## Federal Truck To Make Heavy-Duty Units Only

Now back to normal operations, Federal Motor Truck Co. is now developing several heavy-duty trucks and expects the first units off the line early in February. Federal, prior to two changes in ownership in the last several months, produced both light and heavy-duty units, but will now manufacture the latter only.

The company was purchased last June by Mast-Foos Mfg. Co., which recently sold the name, tooling, design rights, and inventory to a Minneapolis group which makes and sells truck parts and subassemblies. The new owners hope to re-establish the special model Federal Truck production. It is already shipping service parts for existing vehicles to its 300 dealers.

Production will resume in the Detroit plant, and truck units ranging in size from 27,000 to 60,000 GVW and tractors from 50,000 to 100,000 GCW will be offered in the standard line. Bigger units will be built to particular operators' needs. In addition, a new cab-over-engine unit is being developed. An initial production of 50 units a month is scheduled.



## AMERICAN MOTORS PRESENTS 1955 RAMBLER

Representative of the 1955 Rambler line, which will be offered by both Nash and Hudson dealers with separate nameplates, is the four-door sedan on a 108-in. wheelbase. The series is powered by the Super Flying Scot six-cylinder, L-head, 90-hp engine with a compression ratio of 7.3:1 and displacement of 195.6 cu in. Principal styling changes are full-wheel cutouts in front fenders and a new die-cast grille.

## Packard Loses \$8 Million During First Nine Months

For the first nine months of this year, Packard reported a net operating loss of \$8,437 million, compared with a profit of \$6,083 million in the like 1953 period. Packard attributed part of the loss to the prolonged shutdown of its East Grand Boulevard plant in Detroit which was necessary to transfer operations to the Conner Ave. plant. Total sales for the period were not reported.

## New Defense Contracts Valued at \$700 Million

Some good news came last month to the automotive industries which have been pushing efforts to obtain additional defense work for slowed-up plants. The Army's Ordnance Tank Automotive Command announced that it expects to award in the neighborhood of \$700 million in new contracts

during the next fiscal year. Approximately \$500 million of this amount would go to automotive plants.

While the total expenditure is far under the peak of \$9 billion in 1952, the contracts will be a shot in the arm to many plants which have facilities for producing the defense goods. Biggest awards, totaling \$405 million, will be for tanks and combat equipment. The remainder of the total will be split up for tactical trucks, \$65 million; commercial vehicles, \$20 million; research and development, \$20 million; spare parts, \$100 million; and miscellaneous items, \$90 million.

The OTAC notes that there has been an appreciable reduction in the cost of defense goods since the end of the Korean War. Keen competition and experience of automotive companies in turning out products for the Government have resulted, for example, in a 20 per cent reduction in the cost of an M-48 tank, and even bigger savings in truck batteries.

# News of the AUTOMOTIVE



## 1955 DODGE MODELS FOR EXPORT CUSTOMERS

Representative of the 1955 Dodge line for overseas buyers is the Kingsway-Custom Sport Coupe. Other cars in the series of five are the Coronet, Kingsway, Royal, and Custom Royal. Both V-8 and six-cylinder engines, ranging up to 183 hp, are offered, and special equipment available includes: PowerFlite transmission; power steering; power brakes; power seat adjustment; power window lifts; and air conditioning.

### New Willys Jeep Bows This Month

Willys Motors, Inc., will bring out a new version of its civilian Jeep sometime this month, preceding the introduction of other Kaiser-Willys cars and utility models. The company said that several hundred of the new Jeeps have already rolled off the assembly lines in Toledo.

### AMC Counting On Rambler To Increase Sales Volume

In anticipation of a sizable market for a smaller automobile and a trend to multiple-car ownership, American Motors Corp. hopes to regain its share of the industry market next year with an intensive drive to make the Rambler its basic volume car. By offering the car to both Nash and Hudson dealers and pricing it below the smallest cars produced by the Big Three, AMC feels it will go far next year toward achieving its goal.

While both Nash and Hudson dealers for the present will offer the same Rambler model (with no difference except the nameplate), American Motors plans ultimately to produce the car in separate series. Although it has an added sales force already behind it through the combination of the Nash and Hudson dealer organizations, AMC is planning to increase its dealer outlets by another 1000.

Pointing out that multiple-car ownership has increased 15 per cent in the last eight years, AMC feels that a smaller car such as the Rambler or Metropolitan is the answer to some of the present-day traffic and parking problems. It is confident that the small body style can make it the fourth low-priced car.

In order to get the volume needed for maximum tooling and manufacturing, American Motors estimates that it will have to sell 160,000 to 200,000 cars a year. The corporation expects to reach that volume in about four years.

While it will still require time for AMC to realize the full advantages of the Nash-Hudson consolidation, there have already been several beneficial results in sales, merchandising, and production. Savings on tooling new models of both Nash and Hudson cars so far have amounted to around \$15 million. Both cars are using the same basic body shells.

Canadian subsidiaries of Hudson and Nash are now starting to pool their facilities in the same fashion as AMC in this country. Both are integrating their body building and assembly operations in Toronto, as well as warehousing facilities. The consolidation will bring together both Nash and Hudson plants there under the American Motor's Export and Subsidiaries Div. in this country.

### Loss in Third Quarter Reduces Chrysler Net for Nine Months

Its first quarterly loss in nearly four years has been reported by Chrysler Corp. For the three months ended Sept. 30, the corporation had a loss of \$12.067 million, which reduced earnings for the first nine months of this year to \$3.724 million, against \$55.676 million in the like 1953 period. In the third quarter of 1953, Chrysler had a profit of \$11.539 million.

Earnings, including those of all foreign subsidiaries, for the nine months totaled \$3.724 million, compared with \$55.676 million in the corresponding period of 1953. Sales dropped from \$2.576 billion to \$1.402 billion, the report to stockholders shows.

In the nine-month period Chrysler produced a little over half the cars and trucks it did in the same period last year—585,783 units against 1,083,492 in 1953. Shipments from U. S. plants alone were 535,464 in 1954, compared with 1,024,978 in 1953. The corporation is seeking to regain at least 20 per cent of the market in 1955.

As was the case with General Motors and Ford, Chrysler's defense work dropped substantially this year. Defense work at Chrysler for the first nine months of 1954 was approximately 17 per cent of total sales, as compared with 21 per cent last year. The corporation hopes to boost its defense activity now that it has received a \$160 million contract to make the Patton M-48 tank and new assignments for production of missiles.

### Borg-Warner Establishes New Canadian Subsidiary

Borg-Warner Corp. has announced the formation of a new manufacturing subsidiary, Morse Chain of Canada, Ltd. The new company, which will occupy a plant to be built at Simcoe, Ont., will produce automotive and industrial chain for the Canadian market.

Another Borg-Warner plant, to be operated by Long Manufacturing Ltd., a subsidiary, is under construction at Oakville, Ont. Automotive radiators will be produced there.

# AND AVIATION INDUSTRIES

## Packard Conner Plant Producing '55 Models

Transfer of Packard's final assembly and body-making work to the Conner plant in Detroit, now in production of 1955 cars, brings these two operations under one roof for the first time since 1941. Prior to the move, Packard assembly work was carried on in the company's East Grand Boulevard plant in Detroit, while bodies were shipped in from the Conner plant, which Packard now is leasing from Chrysler.

## Kaiser Moving Detroit Operations to Toledo

Seeking to increase production of Jeeps and trucks, Kaiser Motors Corp., which has disposed of several surplus plants in recent months and brought some of its other facilities into Toledo, has started moving its last Detroit area operations to the Ohio city.

Part of a program to consolidate all motor vehicle operations in Toledo, the transfer will involve about \$3.5 million worth of equipment from the Detroit Engine Div. Casting work will also be moved from its Wilson Foundry Div. in Pontiac, Mich.

In addition, the company will transfer its body stamping work from

Shadyside, Ohio, to Toledo. The Shadyside plant will continue to handle outside stamping jobs.

Kaiser, which has been recently moving a lot of its equipment to new plants in South America and other countries, indicated that it would continue to manufacture its automobiles in Toledo. The 1955 Kaiser-Willys car models and other vehicles will be shown Dec. 8 to dealers and distributors via an international closed-circuit television network. They will be introduced to the public in January.

Present plans call for production of 100,000 units in 1955, a figure which includes cars and commercial and civilian vehicles. Improvements of plant facilities in Toledo are expected to cost the company about \$1 million.

## Car Contraband Loss In Mexico Is Cited

The Mexican government reportedly loses around \$24 million annually in customs duties alone due to the heavy contraband in automobiles by unscrupulous parties posing as tourists. Legitimate distributors have asked the government to grant a quota of 17,500 automobiles to be assembled by foreign firms maintaining assembly plants in Mexico.

## Warner Electric Sets Up A Subsidiary in Europe

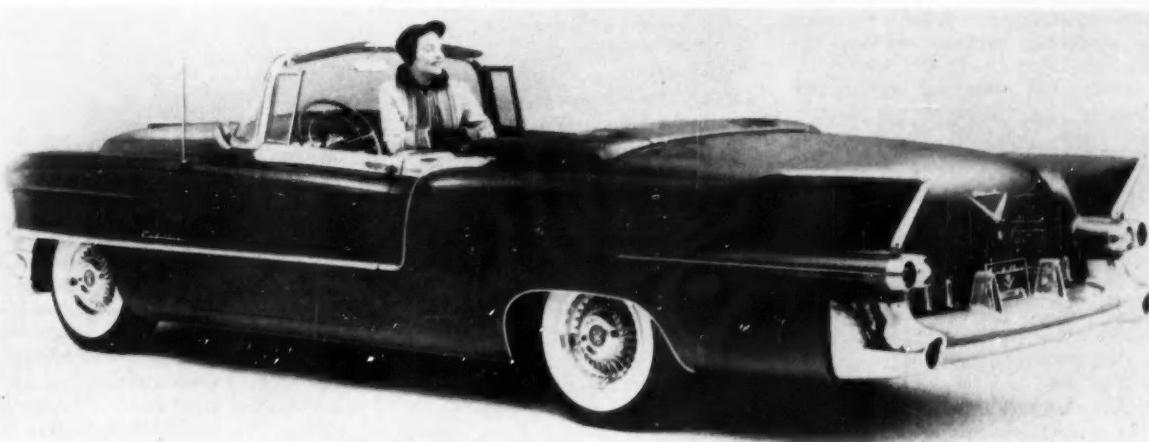
Warner Electric Brake & Clutch Co. has organized a new European subsidiary company known as Warner-Electric, Ltd. It is located in Zurich, Switzerland.

The new subsidiary will handle sales and service of Warner Electric brakes and clutches throughout the European continent. In 1955, the company expects to set up manufacturing facilities in Germany under a licensing arrangement.

## Trio of Former Marks Fall During Pan-American Race

Three records were shattered during the recent 1908-mile Pan American Road Race in the Large-Sports Car, Small Sports Car, and Small Stock Car Divs. Victorious cars were, respectively, Ferrari, Porsche, and Dodge with times of 17:40:26, 19:32:22, and 22:35:53. Winner of the Big Stock Car Div. title for the third year was a Lincoln with a time of 20:40:19.

Umberto Maglioli was driver of the Ferrari which took top prize money of \$18,000. Ray Crawford piloted the Lincoln for a \$17,200 reward.

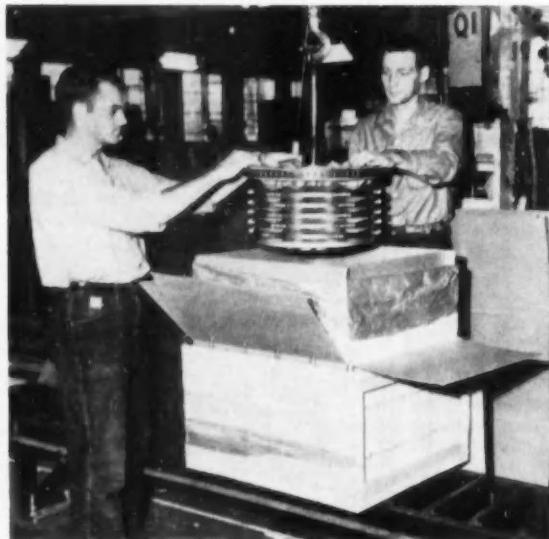


1955 CADILLAC ELDORADO CONVERTIBLE BOWS

Powered by a 270-hp engine with dual four-barrel carburetors, new intake manifold, and special throttle controls, the 1955 Cadillac Eldorado has a wheelbase of 129 in. and an overall length of

233.3 in. Cellular grille is capped by a wider, lower hood, while rear end of the car has a swept-back fin effect and jet exhaust characteristics. Exhaust stacks are made from cast aluminum.

# News of the AUTOMOTIVE



## Oldsmobile Plans to Set New Production Records

Like some other car makers, Oldsmobile plans to establish a production record this year and top it again in 1955. In aiming for eight per cent of the total industry market, the GM division forecasts that it will wind up the year with about 430,000 automobiles, or about 34,000 more units than it produced during 1950, its previous best year. Expansions during the year have enabled Oldsmobile to increase its production capacity by about 15 per cent.

So far, six other car makers are shooting for record or near-record sales next year. They are Buick, Cadillac, Pontiac, Plymouth, Chevrolet, and DeSoto.

## Car Output In High Gear In Closing Weeks of 1954

The production rally in the last few remaining weeks of 1954 will certainly provide the automobile industry with its third best year in history. Although output was greatly curtailed after the mid-year point by the shutdowns of plants during model changeovers, the production spurt in the last two months may set an all-time peak for the period. Total output for the year may end up at more than

the anticipated 5.3 million units.

More than 550,000 cars are planned for December, a month which in previous years has been marked by model changeovers and shutdowns. If the industry reaches that figure, and if it attained the anticipated 500,000 plus units in November, this would be an "exceptionally" good year.

Production would be just about 670,000 units short of 1953, the second best year in history. Production of some 4.4 million cars in the first 10 months was trailing the 1953 figure by about 18 per cent.

The accelerated production pace bolsters the automobile industry's optimism for 1955. Early model changeovers are ushering in the most complete array of new automobile styling and powerplants in nearly a decade. Despite the lower production of cars this year, several car plants have set monthly production records, and others are looking forward to doing the same by the time the year closes.

On the other hand, truck production is not expected to fare as well. The 1.015 million units expected by truck makers for 1954 would be the lowest since 1946, when output reached just about 930,000 units. For the first 10 months of this year, output totaled approximately 830,000 units against 1.034 million in the like 1953 period.

## PRIZE CARTON

A 250-lb costly aircraft brake assembly is lowered by a hoist into a new type of export container at Bendix Products Div. of Bendix Aviation Corp. Square of Cad-block cushioning material, contoured to fit the bottom of the assembly, has been placed directly on the bottom of the wire-bound box. This package took prize honors of the 1954 Protective Packaging and Materials Handling Competition in Chicago recently. The contest was sponsored by the Society of Industrial Packaging and Materials Handling Engineers.

## Chrysler Push For Sales Biggest In Its History

Probably no other advertising campaign in the history of Chrysler Corp. or in the industry, for that matter, has commanded as much attention as the company's promotion of its 1955 line of cars. Triggered off weeks in advance of actual introduction of the automobiles, the campaign started out with "teaser" advertising via radio, television and newspapers, was built up with "suspense" commercials, and culminated on introduction dates with considerable fanfare throughout the country.

"Open house" ceremonies at Chrysler plants throughout the country permitted employees and their families to see the new line of cars before the public showings. Advertising agencies were joined in their sales push by everyone from assembly line workers to Chrysler president L. L. Colbert himself.

Factory workers launched their own advertising campaign by urging merchants and others to "buy a Chrysler product." In a special television show, Mr. Colbert asked "cooperation" of all Chrysler employees, from the top echelon to the workers on the assembly lines.

Price of the advertising and publicity barrage prior to introduction of Chrysler's line of cars is difficult to estimate, but \$20 million would be a conservative figure. Actual advertising by Chrysler during the next several months will be increased by about 16 per cent over the 1953 sum.

## Motor Products Stockholders Examine General Tire Offer

General Tire & Rubber Co. may acquire Motor Products Corp., if stockholders agree to a proposed plan to exchange stock. Under the proposal, Motor Products holders would swap their \$10 common stock for \$100 par value 5½ per cent cumulative preferred General Tire stock. The ratio was not specified.

Motor Products operates plants in Detroit, Marion, O., Chicago, Lake Bluff, Ill., and Walkerville, Ont. The company manufactures vent wings, chrome moldings, and other automotive products.

# AND AVIATION INDUSTRIES



**AXLES HEAT-TREATED**

*Axle shafts for Ford Motor Co. products prepare to receive a high-frequency induction heat treatment at the Mound Road plant. After the operator loads them into the machine and presses the control button, the machine automatically passes them through an electrical coil which heats and water-quenches them. In about 30 sec, the completely heat-treated parts are cool enough to be removed.*

## **AMA Urges U. S. to Assume Prime Road Building Costs**

The Automobile Manufacturers Association, which for 33 years has strongly supported a plan to limit Federal funds for roads to one half of construction costs, has reversed its policy. In a precedent-setting move, AMA last month (November) recommended that the Federal Government assume the full cost of building the 40,000-mile Interstate System.

A staunch advocate of President Eisenhower's proposed \$101 billion road building program, AMA placed that suggestion at the top of its new industry policy. The Association's program also calls for the creation of a Federal Highway Authority empowered to use long-term financing to supplement "insufficient" tax revenues. Furthermore, use of long-term financing for states and communities is suggested.

In addition, AMA is urging the adoption of recommendations for doubling the Federal contribution in the next 10 years for farm-to-market roads, main rural roads and arterial city streets.

# A TABLOID

Production of the Ford Thunderbird is now at a rate of 60 per day. Original tooling was for 30 cars per day.

Douglas Aircraft Co. has been awarded contracts in excess of \$100 million for new Navy combat aircraft. . . . McDonnell Aircraft Corp. has received a \$38.7 million contract from the Navy for development of an advanced experimental all-weather attack fighter type aircraft.

Lear, Inc., has opened a new office in the nation's capital at 1701 K St., N. W., Washington 6, D. C.

Marquardt Aircraft Co. has sold a substantial interest in the company to Olin Mathieson Chemical Corp. . . . ACF Industries, Inc., has acquired Engineering & Research Corp. . . . Pennsylvania Salt Manufacturing Co. anticipates the acquisition of I. P. Thomas & Son Co.

Convair Div. of General Dynamics Corp. will continue development of its Sea-Dart water-based fighter. The plane crashed recently at San Diego, Calif.

Greer Hydraulics of Canada, Ltd., is name of new subsidiary formed in Canada by Greer Hydraulics, Inc.

American Metal Products Co. has acquired General Spring Products, Ltd. . . . Lester Engineering Co. has purchased Phoenix Machine Co. . . . Peerless Electric Co. has bought the physical assets of Sherman Electric Co., Inc.

E. F. Houghton & Co. has disclosed that its non-flammable hydraulic fluid was installed in all Navy aircraft carriers during the past summer.

Du Pont Co. has announced that it will build a new plant to manufacture neoprene synthetic rubber at Montague, Mich.

Glass Fibers Corp. will be the name of new company formed by uniting the Fiber Glass and Corrulex Divs. of Libbey-Owens-Ford Glass Co. and the business and assets of Glass Fibers, Inc.

GM marine Diesels on display at the 1955 National Motor Boat Show in New York will feature new power ratings reflecting increases of from seven to 24 hp.

Taylorcraft, Inc., is now manufacturing a lightweight executive plane with a plastic skin. It is being offered with either a 145 or 225-hp engine.

Pratt & Whitney Div. of Niles-Bement-Pond Co. has relocated its New York office at 42-19 Main St., Flushing, N. Y. . . . Industrial Crane & Hoist Corp. has occupied new quarters at 1536 S. Paulina St., Chicago, Ill.

Passenger Belt Conveyors, Inc., jointly owned by Goodyear Tire & Rubber Co. and Stephens-Adamson Manufacturing Co., has been set up in Aurora, Ill. It will develop passenger belt conveyor systems.

American Society of Tool Engineers has compiled complete engineering data on 12 leading lines of air cylinders into a single package. The Society has also chartered a new chapter at San Antonio, Tex.

Orders have been placed by the Air Force with Minneapolis-Honeywell Regulator Co. for a new electronic pilot to be used in supersonic jet fighter planes.

# News of the AUTOMOTIVE

## OLDSMOBILE NUDGES PLYMOUTH OUT OF FOURTH POSITION

### 1954 New Passenger Car Registrations\*

Arranged by Makes in Descending Order According to the 1954 Nine Months' Totals

MAKE	September 1954	August 1954	September 1953	NINE MONTHS	
				Units 1954	Per Cent of Total 1954
Chevrolet	105,816	110,613	112,386	.033,825	1,027,653
Ford	107,849	109,408	108,424	.033,727	787,981
Buick	41,657	40,549	39,062	.033,646	384,070
Oldsmobile	34,130	37,666	38,282	.037,349	246,811
Plymouth	19,136	27,772	46,074	.030,527	482,825
Pontiac	24,544	27,280	25,629	.026,349	303,401
Mercury	17,000	21,062	20,117	.021,662	196,670
Dodge	10,463	11,283	19,174	.012,952	222,021
Cadillac	8,237	9,756	3,086	.002,952	77,726
Chrysler	5,153	6,438	10,926	.007,419	111,431
Studebaker	6,285	7,801	12,944	.010,617	126,262
Nash	6,795	8,817	7,377	.006,953	116,187
De Soto	5,100	5,448	9,538	.007,144	93,480
Packard	3,173	2,980	4,458	.003,521	60,577
Lincoln	3,070	2,747	2,862	.002,683	32,846
Hudson	2,885	2,986	3,830	.002,945	53,439
Willys	1,193	1,757	2,493	.002,228	35,946
Kaiser	714	877	1,181	.001,144	20,316
Henry J.	105	147	529	.001,044	9,726
Misc. Domestic	256	189	61	.001,860	1,975
Foreign	2,085	2,234	2,103	.001,983	23,237
Total - All Makes	407,644	440,312	453,606	4,139,272	4,370,044
				■ 100.00	100.00

\* Based on data from R. L. Polk & Co.

### Continental Foundry Gets Share of M-48 Tank Order

Continental Foundry & Machine Co. has received an order from the Ordnance Dept. to manufacture some of the parts for the Patton M-48 medium tank. These are being produced by Chrysler under a \$160 million Army contract.

Continental will build some of the hulls, and cast and machine some turrets for the tank. Continental Motors, not affiliated with Continental Foundry, is producing the engines.

### "Mighty Mite" Vehicle Rights Acquired by American Motors

American Motors Corp. has acquired from Mid-America Research Corp. exclusive manufacturing and sales rights for the "Mighty Mite" (see AUTOMOTIVE INDUSTRIES, April 15, 1953, p. 17) combat vehicle. The step could mark the corporation's entry into the specialized military work which it has been seeking.

Production plans for the vehicle have not yet been developed, but AMC officials are optimistic about a military order soon. There are no plans "at the present time" to produce the vehicle for civilian use.

The vehicle, which would use a

small aluminum aircooled engine developed by Nash, would be built by the newly organized Hudson Special Products Div. of AMC at the former automobile manufacturing plant of Hudson in Detroit. Since automotive facilities at that plant have been moved to the Nash plant in Wisconsin, the Detroit unit has been turning out some aircraft parts and automobile parts formerly purchased from

quite a number of outside sources.

Developed by Mid-America for the Marine Corps a couple of years ago, the "Mighty Mite" is claimed to be the first practical vehicle light enough (1500 lb) to be ferried by combat helicopters. Up until now, the vehicle has used the German-made Porsche aircooled engine.

Each wheel is independently suspended with cantilever leaf-type springs, and there is said to be a full eight inches of vertical wheel travel before the vehicle "bottoms" on its springs. Bump absorption is aided by built-in shock absorbers.

Other features of the "Mighty Mite" include: four-wheel drive system with No-Spin differential which transmits power to whichever wheels have traction. Transmission is a specially designed three-speed unit, plus a two-range transfer case, to provide six speeds forward and two reverse.

Pivot center steering is said to eliminate the need of fighting the wheel when the vehicle travels over rough terrain. Located inside the wheel hubs, the king pins reportedly permit each front wheel to pivot on its true axis and thus eliminate most road shock.

The vehicle is 96 in. long, 58 in. wide, and has a wheelbase of 64.5 in. It is claimed that the "Mighty Mite" can carry a payload of 500 lb while towing another 1000 lb.

### 1954 RETAIL CAR SALES BY PRICE GROUPS\*

Price Group	Number of Cars							
	September		1954		1953		Nine Months	
Units	% of Total	Units	% of Total	Units	% of Total	Units	% of Total	Units
Under \$2,000	242,493	59.78	277,116	61.37	2,455,797	59.70	2,385,823	55.13
\$2,001 to \$2,500	106,765	26.32	119,011	26.35	1,056,982	25.85	1,224,705	28.18
\$2,501 to \$3,500	40,387	9.98	43,561	9.85	439,115	10.86	582,259	12.71
Over \$3,500	15,864	3.94	11,887	2.63	164,396	3.99	173,113	3.98
Total	405,609	100.00	451,575	100.00	4,120,290	100.00	4,345,700	100.00

### Dollar Volume of Sales\*

Price Group	Dollar Volume of Sales*							
	September		1954		1953		Nine Months	
Dollars	% of Total	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total	Dollars
Under \$2,000	\$ 440,965,015	91.41	\$ 482,477,277	53.50	\$ 447,872,056	51.29	\$ 428,091,963	46.94
\$2,001 to \$2,500	244,926,488	26.56	265,712,310	28.80	2,419,747,217	27.71	2,733,331,635	29.78
\$2,501 to \$3,500	110,114,128	12.84	119,614,756	12.87	1,190,003,884	13.73	1,516,396,963	16.51
Over \$3,500	61,662,545	7.19	43,856,708	4.73	636,306,850	7.27	648,757,585	7.07
Total	\$ 857,656,174	100.00	\$ 922,461,046	100.00	\$ 873,930,587	100.00	\$ 917,818,146	100.00

\*Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedans or equivalent model. Does not include transportation charges or extra equipment.

†New registrations of American made cars only. Does not include imported foreign cars.

# AND AVIATION INDUSTRIES

## Studebaker-Packard Awarded Second Gas Turbine Contract

Studebaker-Packard Corp.'s efforts to gain new defense work are producing results. Award of a second contract recently to the company for developing another gas turbine engine for the Navy marks the second such assignment the automobile firm has been given in the last several months.

While value of the contracts is classified, both are for the design and development of new type gas turbine engines. One calls for a low-thrust (2000 lb.) engine and the other for a 10,000-shaft-horsepower engine.

Work on the two engines will be done at the company's Boulevard plant in Detroit, which formerly housed automobile production facilities. In addition to turbine work, Studebaker-Packard hopes to receive additional Air Force contracts for jet engines.

The corporation is presently doing some aircraft work at the Boulevard plant. It expects larger contracts for overhauling Allison J-33 engines and for producing the new 2000-lb thrust turbojet engine.

Studebaker-Packard expects to have one of its gas turbine engines ready for testing soon. It is said to have favorable fuel consumption and to lend itself to quantity production. The possibility of adapting the gas turbine engine to motor vehicles reportedly is not in the company's plans at the moment.

## Sale of Reo to Bohn Surprises Industry

Sale of Reo Motors, Inc., to Bohn Aluminum and Brass Corp. came as a surprise to the industry. It was a complete switch from speculation that Henney Motor Co. would continue the truck business of the company. Henney, which agreed to purchase Reo last July, had indicated that it was shooting for the No. 1 spot among the truck independents.

Bohn will pay a reported \$16.5 million for Reo, the same price that Henney had agreed to pay for the truck assets. The transaction between Henney and Bohn is scheduled to be consummated Dec. 31.

Under the agreement, Reo stock-

## SEPTEMBER TRUCK SALES UP SLIGHTLY OVER AUGUST TOTAL 1954 New Truck Registrations\*

Arranged by Makes in Descending Order According to the 1954 Nine Months' Totals  
NINE MONTHS

MAKE	September 1954	August, 1954	September 1953	1954	1953	Units	Per Cent of Total
Chevrolet.....	24,402	22,959	27,205	223,093	254,733	35,58	36.04
Ford.....	21,590	21,115	25,463	206,903	185,465	32,90	32.28
International.....	6,257	6,532	7,213	61,423	75,254	9,77	10.65
G. M. C.....	5,111	5,113	6,427	51,293	65,548	8,16	8.28
Dodge.....	4,585	4,499	6,181	44,931	65,600	7,14	7.28
Studebaker.....	532	794	1,575	7,860	18,711	1,25	2.65
White.....	634	723	814	17,688	9,383	1,22	1.33
Willys Truck.....	1,017	862	528	5,807	6,852	.82	.94
Willys Jeep.....	657	541	740	5,502	6,971	.67	.79
Mack.....	509	447	631	4,571	5,308	.73	.75
Diamond T.....	200	196	297	2,011	2,617	.32	.37
Reo.....	192	151	273	1,734	2,741	.28	.30
Brockway.....	135	117	155	968	1,552	.15	.22
Autocar.....	45	71	130	825	1,312	.13	.19
Misc. Domestic.....	282	225	864	3,411	4,555	.54	.64
Foreign.....	26	36	23	232	206	.04	.03
Total - All Makes ...	86,174	84,180	78,319	628,058	706,606	100.00	100.00

\* Based on data from R. L. Polk & Co.

holders may receive up to \$30 a share after liquidation, starting with an initial dividend not exceeding \$20 a share. Bohn officials have indicated they would continue and expand the truck business of Reo.

blowing machines are being laid out in a more efficient manner in order to tie in new equipment which will supplement the line. A new slat type oven is being installed, extensions are being made to vertical core wash drying ovens, and the horizontal core baking oven is undergoing widening.

In addition to the rearrangement of slat conveyors, drag conveyors, and water test machines, a complete monorail conveyor system is under construction, and a 7½-ton capacity traveling crane is being installed for the expanded facility. There also will be a new 14-way switch for pneumatic sand distribution. Two latest design Simpson mullers with turbo-drive and hoppers are also included in the expansion plans.

The most modern machines available will be utilized for shaking out the castings in the Ford foundry knockout house. Other new machinery around the foundry will consist of two grinders for intake manifold and automatic transmission case work, barrel blast cleaning equipment, and a shot blast cabinet for V-8 blocks. Standard snag grinders currently in use will be relocated for smoother work flow.

To further increase efficiency, new inspection offices are under construction and the production and time offices will be relocated.

## Ford Cleveland Foundry Grows To Meet High Engine Demands

In order to meet the Ford overhead-valve V-8 production requirements established by its 1954 sales pace and anticipated for 1955, the Ford Motor Co. is currently expanding its Cleveland Foundry. This facility supplies castings to the Cleveland Engine Plant.

Two new cupolas are being constructed, and molding lines are being extended and rearranged for the increased work schedules. Present core

# Men in the News



Binks Mfg. Co., Industrial Div.—B. J. Hedger was appointed national sales manager.



Aluminum Co. of America — James P. Haight was named chief engineer.



A. O. Smith Corp., Automotive Div.—John C. Dopke has retired as sales manager.

Aluminum Co. of America, Fabricating Div.—John L. Patterson was named general manager.

Chrysler Div., Chrysler Corp.—Raymond E. Hewlett was named staff project engineer, and Brent C. Jacob, Jr., became chief industrial engineer.

American Motors Corp.—Elmer W. Bernitt was elected vice-president in charge of manufacturing and procurement for the Automotive Div., and Roy D. Chapin, Jr., was elected assistant treasurer of the corporation.

Fairchild Engine & Airplane Corp., Guided Missiles Div.—Arthur E. Harrison was made director of engineering.

Dodge Mfg. Corp.—Carl W. Petersen was elected vice-president and works manager, and Edgar M. Carver has retired as first vice-president, although he will remain a member of the board of directors and consultant.

Allison Div., General Motors Corp.—James E. Knott was named assistant manager of the Aircraft Sales Dept.

Michigan Oven Co.—LeRoy M. Gill has been appointed sales manager.

Firth-Loach Metals, Inc.—Louis De Marco has been appointed vice-president in charge of sales and engineering, and James E. Gray has been named sales manager.

Clearing Machine Corp.—E. P. Cunningham and Albert Clements have been appointed vice-presidents. The former will be in charge of sales, while the latter will head the Hamilton, O., plant.

Electric Auto-Lite Co.—H. D. Wilson has been appointed administrative assistant to the vice-president in charge of engineering; George E. Spaulding, Jr., chief ignition engineer; Howard D. Burns, chief engineer of the Battery Div.; L. P. Atwell, assistant to the chief ignition engineer; J. F. Elwell, senior spark plug engineer; K. E. Brandenburg, senior distributor and coil engineer; J. F. Gage, senior electronics engineer, and E. W. Meyer, Jr., senior ignition research engineer.

Westinghouse Electric Corp., Gearings Div.—J. D. Warfield has been appointed assistant manager.

Youngstown Sheet & Tube Co.—E. S. Steigner has been appointed supervisor of the Service Engineering Dept.

Chrysler Corp.—William P. Balthrop has been named quality inspection supervisor.

Bristol Aeroplane Co. of Canada—B. A. Chalmers is now secretary.

Goodyear Aircraft Corp.—R. W. Richardson has been named vice-president in charge of sales.

Republic Aviation Corp.—Kermit F. Wasmuth has been appointed director of quality control.



Joseph T. Ryerson & Son, Inc.—Melvin B. Manson has been made manager of the Milwaukee plant.

American Motors Corp.—Charles T. Lawson has been named executive vice-president in charge of the Appliance Div., while B. A. Chapman has been appointed vice-president and general manager of the Kelvinator Div.

Continental Motors Corp., New Products Div.—Lt. Gen. Doyle O. Hickey, USA (Ret.) has been named director, and H. J. Buttner is now manager.

Dunlop Tire & Rubber Corp.—Robert J. Patrick has been appointed tire sales manager.

Standard Pressed Steel Co., Sel-Lok Spring Pin Div.—John D. Wilson has been appointed manager.

Babb Co., Inc.—Leonard D. Sullivan has been named vice-president in charge of sales.

Chrysler Corp.—Sam Petok has been placed in charge of the new public relations office in New York City.

Pennsylvania Salt Mfg. Co.—M. S. Pancoast has been named representative for the Metal Processing Dept. in the New York territory.

Dreis & Krump Mfg. Co.—J. A. Schaefer has been elected executive vice-president.

Canadair, Ltd.—James T. Toley has been appointed a vice-president.

Yates-American Machine Co.—J. J. Gallagher succeeds E. J. Dalton as president, while the latter remains chairman of the board.

Acme Steel Co.—Allan N. Moore is now manager of the Traffic Dept.

Logansport Machine Co., Inc.—E. L. Kimes was made vice-president and treasurer, and L. L. Austin became vice-president and secretary.

American Machine & Foundry Co.—John B. Holbrook is now manufacturing assistant of the General Products Group.

L. Sonneborn Sons, Inc., Amalie Div.—Chester H. Remmel has been made field sales manager.





**Wagner Electric Corp.** — **George M. Coffey** has been named manager of industrial brake sales.

Oldsmobile Div., General Motors Corp.—**Carl F. Deist** has been appointed Pacific regional manager.

Vickers, Inc.—**William J. Herrmann** has been named factory manager of the Detroit plant, while **Gilbert L. Stancliff, Jr.**, and **Charles J. Cannon** have been chosen manager and assistant manager, respectively, of the Federal Contracts Sales Dept.

Grumman Aircraft Engineering Corp.—**E. Clinton Towl** has been named administrative vice-president; **Robert L. Hall**, vice-president for engineering; **William J. Hoffman**, vice-president for manufacturing engineering; **Charles Kingsley**, vice-president and general counsel; **David Rittenhouse**, vice-president for production; and **George F. Titterton**, vice-president for contracts.

Eclipse Fuel Engineering Co. of Canada, Ltd.—**Bert H. McGill** has been appointed president and general manager.

Morse Chain Co.—**Louis P. Smith** has been named vice-president of manufacturing operations; **M. V. Bailliere**, in charge of all finances; **Norman C. Bremer**, chief engineer at the Detroit plant; and **James V. Davis**, industrial relations manager of the Detroit plant.

P. O. McIntire Co.—**Sam J. Forbes** has been made chairman of the board of directors; **Charles D. Shannon**, president; and **Alfred G. Goglin** has been appointed vice-president and general manager.

Acme Steel Co.—**Walter F. Hinkle** was elected vice-president of engineering.

Youngstown Sheet & Tube Co.—**P. G. Boyd** has been promoted to western manager of sales.

Alloy Precision Castings Co.—**Ronald D. Gumbert** was elected president and a member of the board of directors.

U. S. Spring & Bumper Co.—**David M. Diltz** is now general manager of sales; **O. W. Carrico**, general manager of manufacturing; and **Ray W. Howell** staff assistant to the vice-president and general manager.



**A. O. Smith Corp.** — **Urban T. Kuechle** has been named sales manager of the Automotive Div., and **Milton E. Morgan** has been advanced to assistant general sales manager for automobile products.

Robertshaw-Fulton Controls of Canada, Ltd.—**John A. Robertshaw** has been elected president; **George A. Elliott**, vice-president and general manager; **Walter H. Steffler**, secretary and treasurer; **B. D. Taylor**, comptroller; and **H. William Biggar**, assistant secretary and assistant treasurer.

Greer Hydraulics of Canada, Ltd.—**Edward J. Scott** has been named operational manager.

Warner Electric Brake & Clutch Co.—**Reginald Whitson** has been named Government liaison engineer.



**E. W. Bliss Co., Hastings Div.** — **Carl J. Ricker** has been named chief sales engineer.

General Electric Co.—**W. J. Kinsey** is now the sales manager of engine controls in the Aircraft Products Dept.

AP Parts Corp.—**Hal W. Rice, Jr.** has become southeastern regional sales manager.

Stanley Aviation Corp., Buffalo Div.—**Benson Hamlin** was made chief engineer, and **R. Douglas Rumsey** is now assistant chief engineer.

International Nickel Co.—**William H. Sparr, Jr.** is now in charge of the Steel Section of the Nickel Sales Dept.

Yates-American Machine Co.—**Roger Birdsell** was made a director.

Flexonics Corp., Expansion Joint Div.—**E. L. Hiter** is now sales manager.

Regal Plastic Co.—**Alfred J. Diebold** was made manager of quality control and tool design.

Radioplane Co.—**Robert R. Miller** has been elected a director.

**Chrysler Corp.** — **Jack B. Baldwin** was appointed assistant defense contracts administrator.



New Departure Div., General Motors Corp.—**Robert E. Lutz** is now manager of the Cincinnati zone sales office.

Ramo-Wooldridge Corp., Guided Missile Div.—**Dr. Herbert C. Corben** and **Dr. Wendell A. Horning** have joined the staff as physicists.

Gould-National Batteries, Inc., Automotive Div.—**David Sullivan** has been appointed chief inspector, product quality control.

North American Aviation, Inc.—**Joel R. Baker** has been named chief engineering test pilot.

Minnesota Silicone Rubber, Inc.—**E. Burke Neff** was elected vice-president and general manager.

### Necrology

**William S. McLean**, 57, former general director of advertising and public relations for Fisher Body Div. of General Motors Corp., died Nov. 15, at Detroit, Mich.

**Dr. Richard H. Patch**, 66, vice-president in charge of operations for E. F. Houghton & Co., died Nov. 13, at Hot Springs, Ark.

**William Adam, Jr.**, 55, president of Ajax Electric Co., died Nov. 8, at Baederwood, Pa.

**Dawson J. Burns**, 76, former president of Ward Leonard Electric Co., died Nov. 7, at New York, N. Y.

**Samuel D. Fuson**, 64, vice-president in charge of public relations and a director of Kudner Agency, Inc., died Nov. 4, at Flemington, N. J.

**Reuben P. Resor**, 81, retired treasurer of Standard Oil Co. of New Jersey, died Nov. 4, at New York, N. Y.

**Maj. Gen. Arthur W. Pence**, 56, commanding general of the Army Engineer Center, died Nov. 8, at Fort Belvoir, Va.

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**easy, quick,  
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*of your parts with*



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in every foot the*

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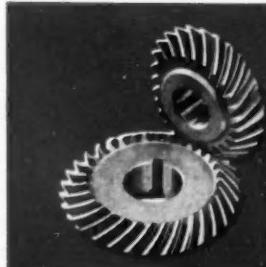
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Alliance, Ohio—Welded Carbon Steel Tubing



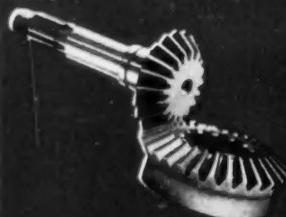
TA-4035 (CWM)



SPIRAL BEVEL GEARS



HYPOID BEVEL GEARS



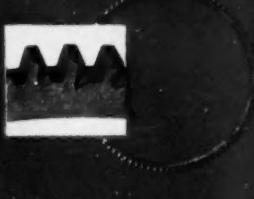
ZEROL BEVEL GEARS



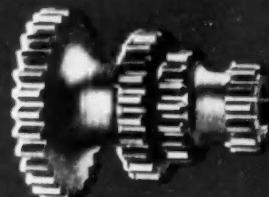
STRAIGHT BEVEL GEARS



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If one (or more) of these types is included in your product, it may pay you to review the facts about Double Diamond Gears contained in this book.

We will be happy to send you a copy. Why not write for one today?

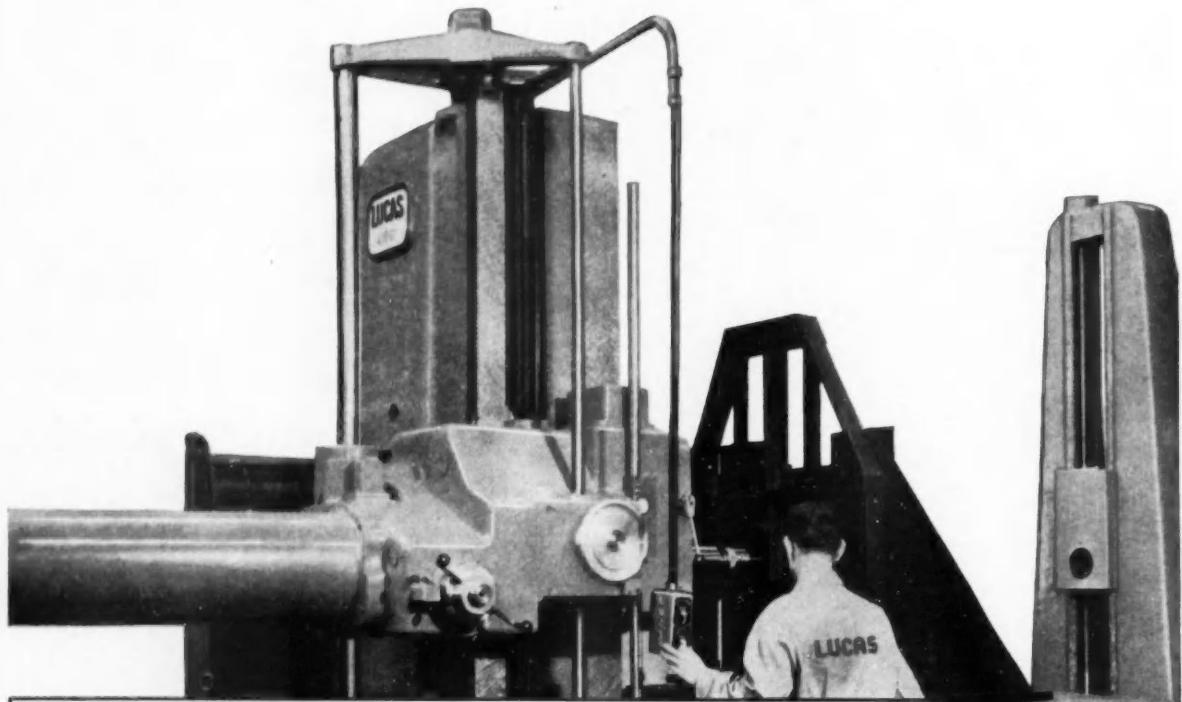


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GEAR-MAKERS TO LEADING MANUFACTURERS

Automotive Gear Works, inc.

ESTABLISHED IN 1914

RICHMOND, INDIANA



Here is the new, lightweight, swing-about pendant control on the Lucas horizontal boring machine. This flexible control places at the operator's finger tips, over the entire working area about the machine, START, STOP, JOG (forward and reverse) of the spindle rotation, and START, STOP, INCH and RAPID TRAVERSE of all unit motions.

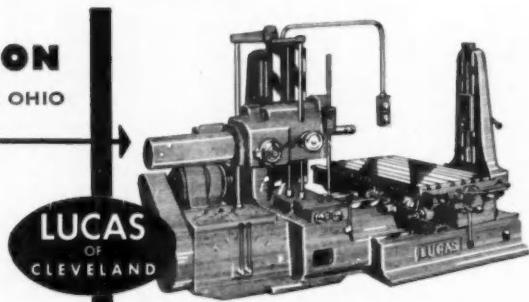
Two smooth operating switch levers in this small-dimension pendant do the work of ten control buttons. The position of the levers gives quick visual indication of engagement and direction. One of many features that is keeping Lucas out in front among horizontal boring, drilling and milling machines.

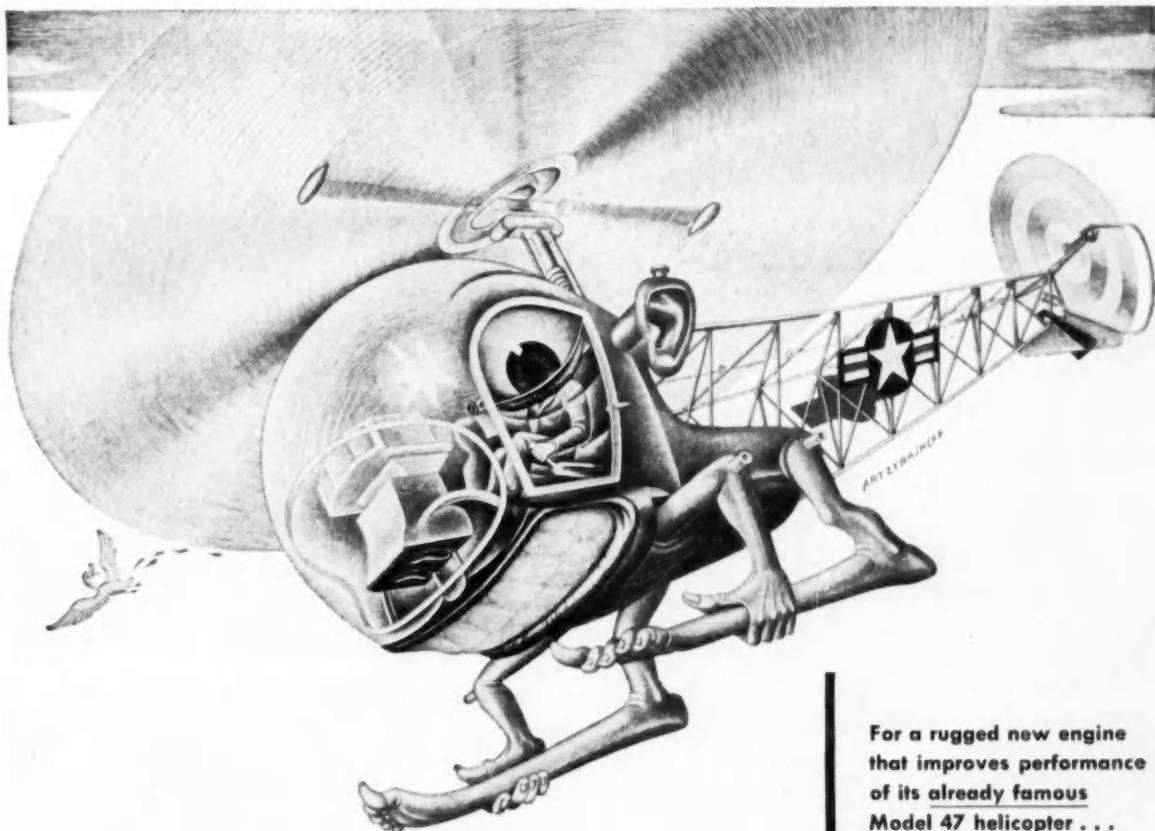


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**Lucas Horizontal Boring, Drilling and Milling Machines**  
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## New "vitals" for this Korean air vet

This battle-proven hero of 18,000 front-line rescues over Korea is now *outperforming itself*—newly powered by Lycoming's 250-h.p. O-435 engine.

With this superior power plant, both the Model 47 and its sister ship—the 4-Place Utility 47G-1—will fly faster and higher in all weather . . . and require far less maintenance.

Such performance improvement is but one of many Lycoming contributions to air-cooled power.

Can you use superior air-cooled power . . . or any other of the diversified services listed at the right of our signature? *Whatever your problem . . . look to Lycoming!*

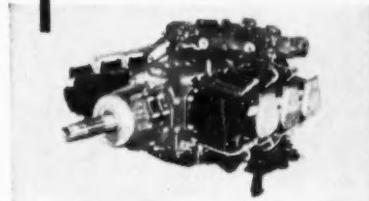
*Automotive and  
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DIVISION OF  STRATFORD, CONN.  
Manufacturing plants in Stratford, Conn., and Williamsport, Pa.

For a rugged new engine  
that improves performance  
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**Model 47 helicopter . . .**  
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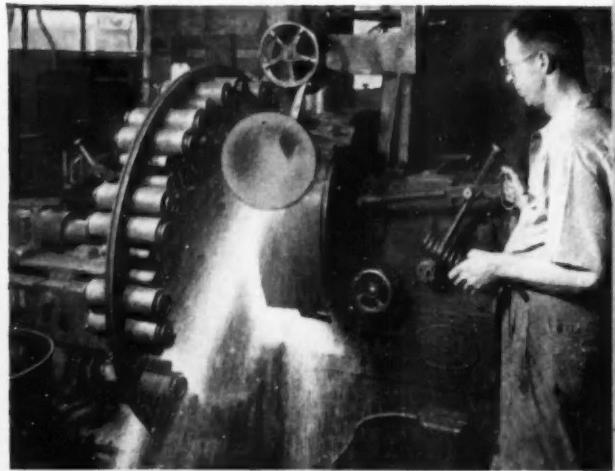
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# *disc grinding range*

Norton discs are engineered for every type of grinding, on all materials, all machines—to bring you the profit-boosting

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Your disc grinding operations may be anything from snagging to lapping, single or double surfacing, on large or small areas, dry or wet grinding.

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for practical aid in selecting the Norton discs that will add the money-saving "Touch of Gold" to every disc grinding job you do. Ask him for the new booklet, "Disc Grinding." Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

What Norton discs have done for others is good evidence of what they can do for you. Check these reports, typical of many from present users:

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"Outlasted and outperformed all other discs—gave 366,975 pieces without burn."

"Averaged 21,500 pieces, a new high for this job."

"Outproduced previous discs 2 to 1."

"High above competition for output and grinding quality."

"Gave 20% longer service life."

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# Sectionized AUTOMATION

## Applied to Huge Transfer Machine

**350-Ft in Length, New Unit Performs 555 Operations on V-8 Cylinder Block and Has Capacity of 100 Blocks Per Hour**

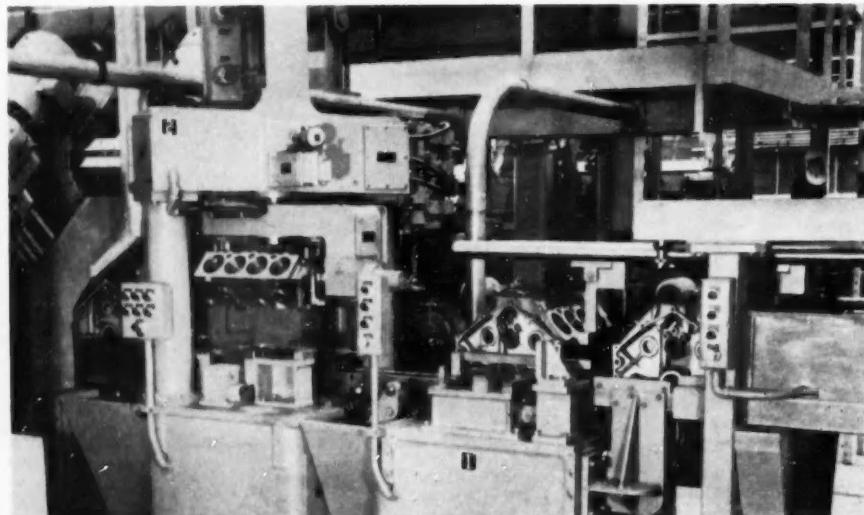
**I**NFORMATION concerning a new transfer machine of unusual construction has just been released, and although it has been in operation in a large automobile plant, the name of the automobile company is not to be announced until a later date. This transfer machine was built by The Cross Co. for production of V-8 cylinder blocks for a 1955 engine.

The machine is 350 ft long and performs 555 operations. It does all of the drilling, chamfering, tapping, camshaft boring and miscellaneous milling on these parts at the rate of 100 pieces per hour at 100 per cent efficiency. More than 100 pieces are in process simultaneously. The only direct labor is the operator at Station 1 who positions the parts and initiates the cycle by push-button. From there on, the blocks are transferred, positioned, machined and inspected automatically in 104 stations.

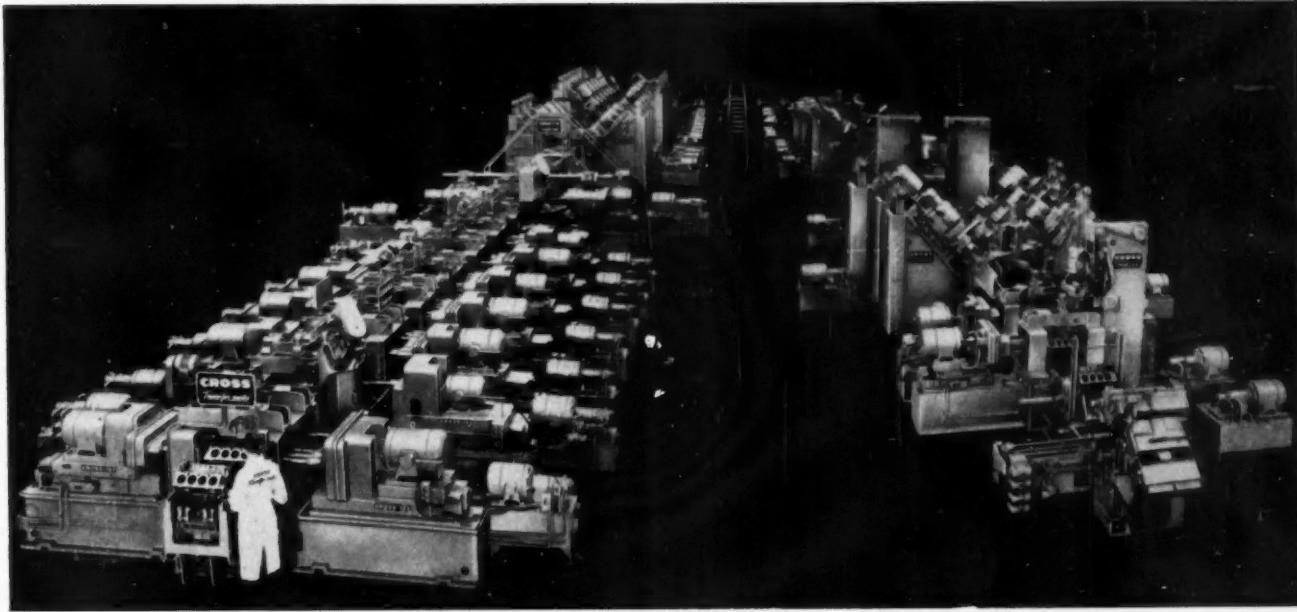
In this first application of "Sectionized Automation," the Transfermatic is divided into five sections. Because any one section can be shut down while all others

remain in automatic operation, a tool change or minor repair can be made in one section while the others continue to produce. Production in the one section can then catch up during a lunch hour or extra shift, if necessary, since any of the sections can run independently with full automatic cycle.

An important part of "Sectionized Automation" is the familiar Cross machine control unit, seven of which are conveniently placed throughout the machine.



**Secondary transfer mechanism of Section 1 delivers the part to Station 1, Section 2**



The new 350-ft long Transfer-matic for machining V-8 cylinder blocks

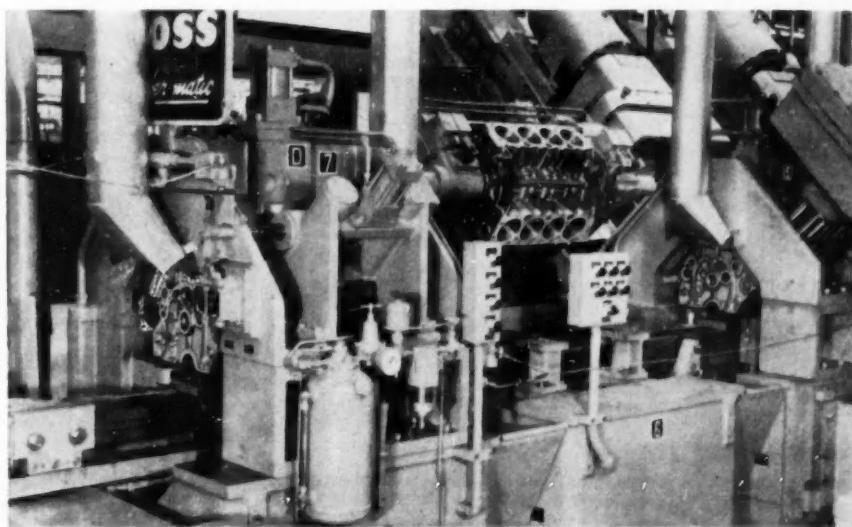
They are equipped with Cross Toolometers to program the operation of all tools. Every time a part is produced, the hands of the Toolometers, which are electrically interlocked with the machine cycle, index counter-clockwise. When one of the hands reaches its zero position, the section of the machine which it governs becomes inoperative. Thus, Toolometers are the automatic control devices which cut the sections in and out of operation, as needed, for tool changes.

The machine control units also provide storage space for two sets of spare tools and tool setting gages for pre-setting every tool in the machine.

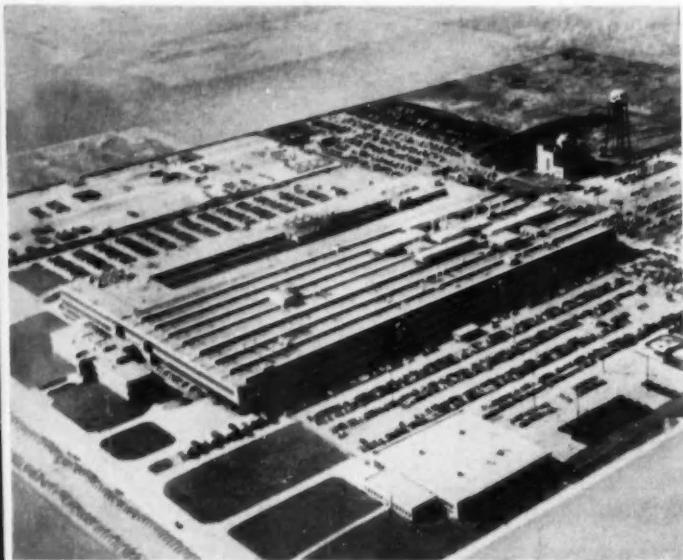
In operation, the machine control units and "Sectionized Automation" work together. If, for example, it is necessary to shut down Section 3 to change one of the tools, the Toolometer controlling the dull tool terminates the cycle of Section 3, but Sections 1, 2, 4 and 5 remain in full automatic operation. The operator continues to feed parts into Section 1 without interruption.

Cylinder blocks coming out of Section 2 are banked up in front of Section 3, while the parts banked behind Section 3 are fed into Section 4. After the tool setter replaces the dull tool with a fresh one from the machine control unit, he re-sets the Toolometer and Section 3 returns to automatic operation in sequence with the other sections.

Each section has a primary and secondary transfer mechanism. All primary units work simultaneously and transfer the parts forward  
(Turn to p. 106, please)



One of the many automatic inspection units for checking cylinder bank faces



Production site of the 50 millionth GM vehicle is this 104-acre Chevrolet assembly plant in Flint, Mich.

### General Motors Marks Historic Milestone with Nationwide Celebration

By Edward Janicki

MORE than one million persons, from production line workers to business and industrial leaders, joined with General Motors on Nov. 23 in celebrating the corporation's biggest event in its history—the production of its 50 millionth vehicle. The

# 50 MILLION Motor Vehicles

milestone was marked by "open house" activities at 125 GM plants and training centers throughout the country, special civic luncheons, and the largest closed circuit television and telephone hookup ever attempted.

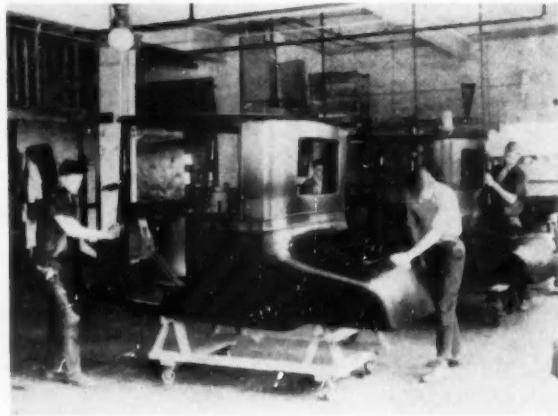
In gaily decorated plants the public saw the part GM's automotive and non-automotive divisions play in the corporation's make-up and the part it has taken in the growth of each plant's community. In addition, special tours of production facilities were conducted throughout the day.

Called the "Golden CARnival," the festivities included a message from GM president Harlow H. Curtice in Flint, Mich., where the milestone car, a 1955 Chevrolet, rolled off the assembly line. Mr. Curtice's talk was transmitted to civic luncheons in 65 cities via television and telephone. The event was filmed and seen almost simultaneously by other GM employees throughout the country on the same day.

Turning back the pages of history, the corporation traces its era of progress from production of the first car in 1908 to the experimental cars of tomorrow. It was in 1908 that the original General Motors Co. turned out its first Cadillac by crude manufacturing methods. The car won the company its first distinction—the Royal Automobile Club's Dewar trophy for interchangeability of parts.



Striking contrast between new and old methods of body finishing is provided in these two illustrations. The left photo depicts a modern finishing line in the Fisher Body assembly plant in Flint, Mich., where present-day tools and machines help workmen get a brighter finish in a few hours than was



possible in many days of hand rubbing. The right scene in Fisher Body's original plant number one in Detroit shows a car body being rubbed with felt and pulverized pumice stone to attain a smooth finish. This was only one of a number of hand operations.

# Since 1908

By 1914, GM was on the market with another engineering "first"—a V-8 high speed engine, used in the Cadillac. The following year GM introduced tilt-beams headlamps on the same car.

The year 1923 ushered in four noteworthy developments. They were Duco lacquer finish; introduction of the Oakland, a GM car later replaced by the Pontiac; the first commercial sale of tetraethyl lead as an automotive and aircraft fuel additive; and four-wheel brakes as standard equipment, brought out on the Buick.

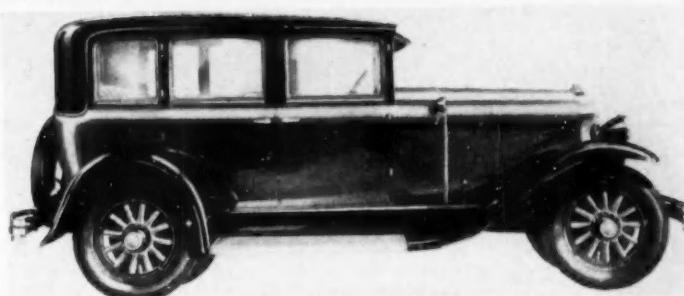
Among GM's other accomplishments of the twenties and thirties, when many car makers were beginning to fail, were the establishment of its proving ground near Milford, Mich., in 1924, introduction of Synchromesh transmission by Cadillac in 1928, no-draft ventilation in automobile bodies in 1933; and independent front wheel suspensions on all GM cars in 1934.

In 1935, GM models featured turret tops, the first one-piece stamped all-steel roofs on closed bodies. The year 1937 saw gearshift levers located on steering columns, and the first semi-automatic transmission on the Olds-

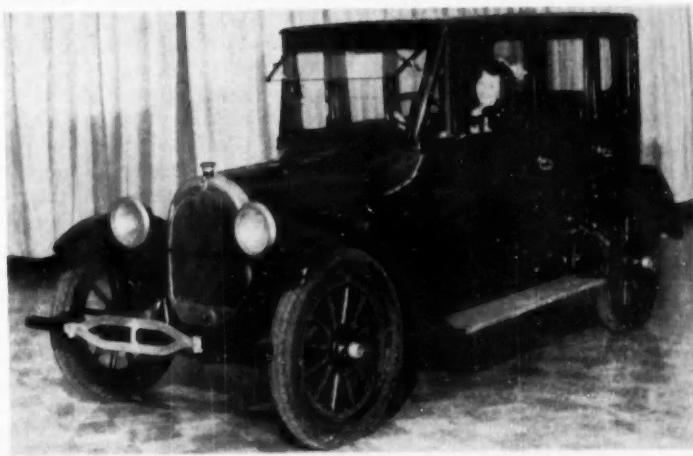
50 MILLIONTH VEHICLE



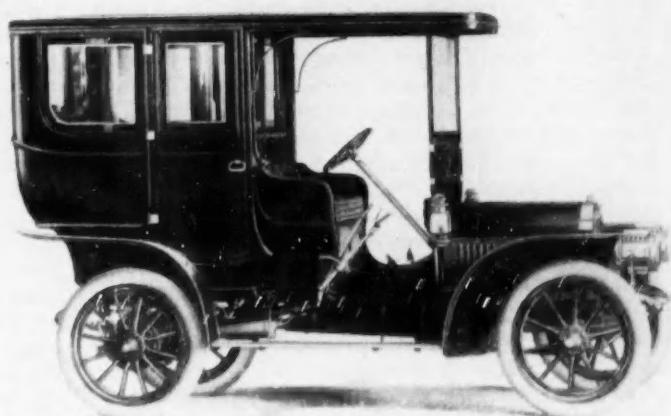
10 MILLIONTH VEHICLE



1 MILLIONTH VEHICLE



FIRST GM VEHICLE



Leading off this historic quartet of GM models from the bottom up is a 1908 Cadillac. It was the first automobile produced after General Motors was formed in 1908. Above it is a 1919 Oldsmobile 37-B model, GM's one millionth vehicle, which was powered by a six-cyl. 44-hp engine. Next is a 1929 Buick sedan with a six-cyl. 74-hp engine which represented GM's 10 millionth vehicle. At the top is a 1955 Chevrolet Bel Air, sports coupe, the 50 millionth vehicle turned out by the corporation.

## GENERAL MOTORS PROGRESS

	1st GM CAR (1908 Cadillac Model G Limousine)	25 MILLIONTH VEHICLE (1940 Chevrolet DeLuxe Sedan)	50 MILLIONTH VEHICLE (1955 Chevrolet Bel Air Sports Coupe)
Cylinders	4	6	8
Horsepower	25	85	162
Wheelbase	100 in.	113 in.	115 in.
Body	Wood	All Steel	All Steel
Other Features	Interchangeable parts; goatskin seat trim; flower vase; oil lamps.	Vacuum-power shift; sealed-beam headlights; one-piece hood.	Powerglide transmission (optional); panoramic windshield; tubeless tires; many options such as power steering, power brakes, etc.
Price in Hours of Labor*	15,700 hours	1,213 hours	1,000 hours

\* Represents the car's delivered-at-the-factory price converted from dollars into hours of factory labor based on average rates of factory pay as reported by the U. S. Bureau of Labor Statistics for the year concerned.

mobile. By 1940, Oldsmobile was offering the Hydramatic automatic transmission.

By developing a highly successful fuel injection system applicable to the two-stroke principle, GM revived interest in Diesel power. This development was dramatized in 1934 by the first streamlined railroad train powered by an Electro-Motive Diesel.

In the field of aircraft development, GM's Allison Div. in 1937 produced the first aircraft engine with a normal 1000-hp rating. Three years later the division was experimenting with the Turbo-Liner, the country's first commercial type airliner powered by turbo-prop engines.

There were other GM contributions to come in the years that followed. The XP-21 Firebird was the first gas-turbine-powered automobile in the country, and the GM Turbocruiser was the first bus in the world to carry a gasturbine power plant.

In looking back at its production record, GM notes that it took it 32 years to produce the first 25 million vehicles, compared with 14 years for the second 25 million. This was achieved despite a halt in civilian vehicle production during World War II.

The present five cars GM is producing are the survivors of 15 makes which the corporation has produced since it was organized on Sept. 16, 1908. GM trucks which have passed from the automotive scene are the Samson and the Pontiac, the latter a panel model discontinued in 1953.

It is interesting to note that out of the 50 million vehicles GM has produced, the 10 cars and miscellaneous vehicles which passed into oblivion accounted for a total output of just 74,179 units. Such former GM makes as the Oakland, Viking, Marquette, LaSalle, Cartercar, Elmore, Randolph, Welch, Scripps-Booth, and Sheridan have all disappeared.

It is also interesting to note how the now extinct makes of GM cars came onto the automotive scene and passed from it. The Oakland, produced by GM start-

ing in 1909, dropped out of the picture when the corporation decided to concentrate production efforts in the Pontiac Div. in 1931. The Welch, which also came out in 1909, lasted only five months.

Companies producing the Cartercar and Elmore were purchased by GM in 1909, and the latter continued them in limited volume until the two holdings were disposed of about seven years later. The Randolph had a short life in 1910. A few Scripps-Booth cars were turned out in 1918-19 after GM bought the company, and the short-lived existence of the Sheridan as a GM product in 1920-21 ended the corporation's expansion so far as acquisition of other automobile companies was concerned.

Cadillac, on the other hand, manufactured the LaSalle from 1927 to 1940; Buick turned out the Marquette; and Oldsmobile produced the Viking in limited volume from 1920 to 1930.

Since its early days, GM has espoused decentralization in theory and practice based on the precept that each unit must pay its own way. The top management echelon at the corporation consists of 32 vice-presidents, 36 general managers (12 of whom are also vice-presidents), 14 general staff executives, four major policy groups, 25 automobile and parts-making divisions, and 19 other divisions in the appliance, aircraft, road equipment, railway, Diesel engine, and other fields.

Although a division general manager is given full authority over his particular unit—as in design, development, and manufacture of a product—overall GM policy shapes his decisions. He, on the other hand, has a voice in setting the policy. Similarly, the "general staff" is always at his disposal should he be confronted with a problem at his division—whether it be engineering, legal, or marketing. The general staff, at the same time, is responsible for keeping the divisional managers informed on the latest development within the entire corporation and industry trends.

This illustration shows how the meeting was handled. Participants are seated comfortably at the tables, each table being provided with several microphones. The latter are all connected to a control cabinet with operators to control volume. Each channel, in turn is connected to a tape recorder to provide a complete and accurate record. The meeting is controlled by a chairman, seated in the foreground out of this view. Scattered among the participants are a number of Vickers engineers and executives from the home plant in Detroit as well as from the various regions, all primed to answer questions, record problems for future study, and provide immediate service to customers and users.



By  
Joseph  
Geschelin

## Aircraft Hydraulic Conference Discloses New Developments

SINCE the reliability of commercial aircraft is a matter of life or death, airline operators are constantly on the watch for improvements in mechanism, accessories, and plumbing. One of the major contributions to this end, at least in the area of hydraulic mechanism, is the annual Transport Aircraft Hydraulic Conference sponsored by Vickers, Inc., one of the major producers of fluid pumps and motors, valves, and other equipment for the hydraulic system of aircraft.

The 1954 Vickers Conference turned out to be one of the most interesting and productive since the initiation of such meetings by the company. Besides providing the expected forum for problems, and failures and fixes, the Conference held early last month included four technical papers dealing with developments and improvements in the hydraulics systems of some major transport airplanes. These papers have as much significance as any similar presentations at meetings of engineering societies.

The importance of the conference to the transport aircraft industry may be gaged from the fact that this year it attracted representatives of 19 foreign and domestic airlines, seven leading airframe manufacturers, and 12 suppliers of parts, accessories and hydraulic fluids.

The two-day meeting was based upon an agenda prepared primarily from questions and problems submitted in advance by the industry. It covered the broad aspects of fluid pumps and motors, seals, accumulators, valves, hose, and safety fluids, as well

as the presentation of the four formal papers.

The Vickers Conference is an event of uncommon character; it invites and encourages criticism of the equipment now in production. This frank approach sets the stage for spirited discussion among the users—the maintenance branch of the industry—the airframe manufacturers, and the suppliers. Sitting in close proximity in one room, these men have an opportunity not only to share their problems but to compare notes with others operating the same or similar equipment. Moreover, as each problem is aired, there is opportunity for suppliers to indicate the fixes, if there are any; or to promise to study and investigate and report to the user.

Participation in this forum discloses not only common problems but inconsistencies as well. In some cases one or more operators appear to have troubles where others have none at all. This in itself is a clue to look for special operating conditions rather than shortcomings in an accessory.

This was particularly true of the growing adoption of safety hydraulic fluids. Many of the problems arising in the field were traced to the shift from mineral oils to safety fluids, some failures occurring where the changeover of parts and seals and O-rings may not have been made completely. It was brought out that some operators have shifted from safety fluids back to mineral oil solely on the basis of standardization.

One of the criticisms of safety fluids is the high cost of the materials and increased maintenance costs.

(Turn to page 108, please)

# Gear Cutting and Measuring Are Main Topics at AGMA Meeting

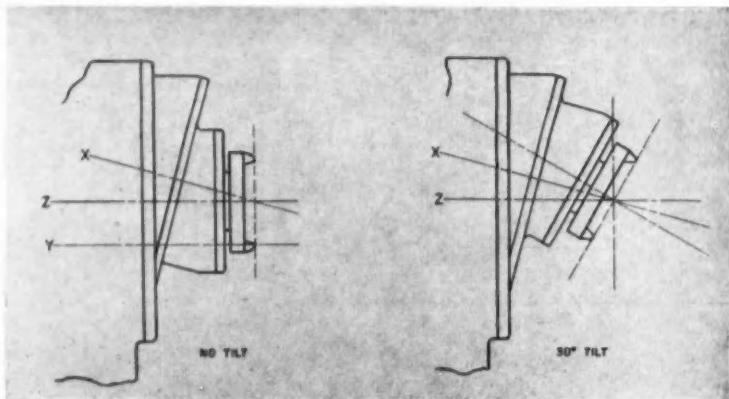
A RECORD-BREAKING gathering of gearing executives and engineers heard three intensely interesting papers at the recent Semi-Annual Meeting of the American Gear Manufacturers Association held in Chicago. The three-day conference, presided over by R. B. Holmes, president of the Association and general manager of Link-Belt Co. in Philadelphia, was also the meeting grounds of 23 AGMA committees endeavoring to establish industry standards and to solve industry problems.

The first paper presented to the 330 persons in attendance was given by Meriwether L. Baxter, Jr., chief research engineer, The Gleason Works, Rochester, N. Y., on the new Unitool method of gear production. This paper gave an account of two unique machines recently placed on the market which are capable of cutting spiral bevel, Zerol bevel, and hypoid gears with one gear cutter.

Mr. Baxter, in discussing the method in brief, stated that the Unitool method is designed particularly for the Gleason No. 106 and No. 116 generators and that it covers spiral bevel and Zerol bevel gears of any ratio and hypoid gears of 3:1 ratio and higher. It also covers all reasonable tooth numbers, pitches, spiral angles and pressure angles. In addition, all reasonable tooth designs including equal-addendum teeth as well as the standard long-and-short-addendum designs, stub teeth, special root line directions, etc., can be produced. With this new method existing gear design need not be changed and the same cutter may be used for both members of the pair. Each gear is completed before removing from the machine. Correct tooth thickness and position of contact are obtained by direct common-sense methods without requiring special operator training. As shown in Table 1, one cutter will cover an extremely wide range of work.

Cutters are of the segmental type and require no shimming or adjusting at any time, according to Mr. Baxter. He also emphasized very strongly that the calculations for the machine settings are comparatively short, and that the mathematical basis of the Unitool method is exact.

By Thomas Mac New



Arrangement for the tilt of the cutter spindle on the new Gleason generators.

Fig. 1

Standard cutters used with the system are designed for a  $22\frac{1}{2}$  deg pressure angle; however, other angles can be cut with slight modification in the procedure.

A rather unique method is utilized in the new Gleason machines for tilting the cutter. According to Mr. Baxter, not only does the method permit high rigidity, but the cutter center does not move when the cutter axis is tilted, a feature which simplifies calculation. Fig. 1 shows the cutter schematically in the positions of no tilt and maximum tilt. The tilt is produced by rotating the cutter axis bodily about an axis X intersecting it at the cutter center, and making an angle of 15 deg with the eradle axis Y. This setting is called the "cutter spindle rotation angle"; when its value is 180 deg the actual cutter tilt is the maximum amount of 30 deg. The swivel angle setting is an adjustment of the tilted assembly about axis Z and controls the direction of the tilt.

## Chip Flow

Some time ago The Fellows Gear Shaper Co., Springfield, Vt., initiated a program for the investigation of

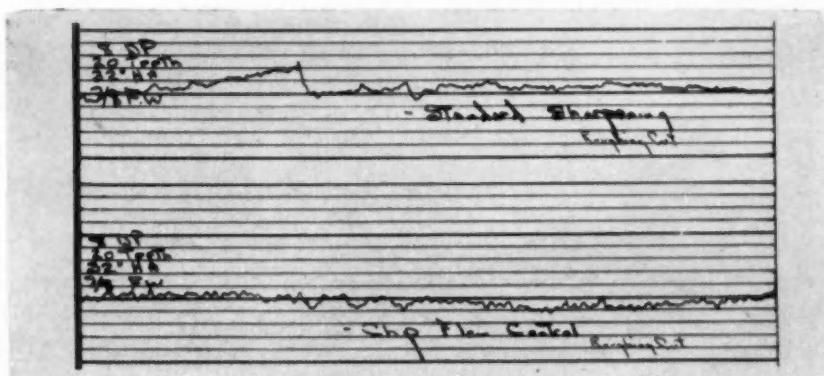


Fig. 2

**Red Liner diagram of gear error with a standard gear cutter and a modified sharpened cutter for proper chip flow control. Chip flow is under current investigation at Fellows Gear Shaper.**

gear cutter behavior since oftentimes speed and feed tables and machinability ratings used for basic metal-cutting practices lose their validity when utilized for gear cutting work. J. F. Jones, Jr., factory manager of the company, in his paper before the AGMA meeting, gave an account of the progress achieved by Fellows in the research program. He stated that out of the investigation have come some discoveries which give a new approach to gear shaping and increase the efficiency of many gear shaper operations.

According to Mr. Jones, the greatest problem of a gear shaper cutter tooth is the control of chip flow. Of course, this problem exists for any generating process and is more difficult than the initial formation of the chip. In the case of most metal cutting operations the chip flows from the tool without obstruction, but in gear cutting, a severe obstruction to chip flow does exist.

Fellows found that control of chip flow in gear shaper operations leads, in some cases, to tool life improvements of up to 400 per cent and production improvements of 100 per cent and more.

Mr. Jones showed one example where the tool life of a cutter was increased 400 per cent by a simple rake angle change. In this case, every effort had previously been made to get better tool life. The estimated savings, just because of the rake angle change to permit better chip flow, are \$60,000 per year including reduced cutter cost and less frequent cutter change.

A graph displayed by Mr. Jones, Fig. 2, of a "Red Liner" diagram of gear errors as deviations from a straight line showed that errors were greatly reduced when modified sharpening was used for chip flow control.

#### Gear Checking

The third and final paper, presented by W. S. Tandler, president, The Warner & Swasey Research Corp., New York City, gave an account of the Probograph dimensional measuring method of checking gears.

In this graphic method, given points on a gear are checked for the coordinate dimensions assigned to them in the drawing. A group of four or more such points on each gear tooth is measured and recorded in

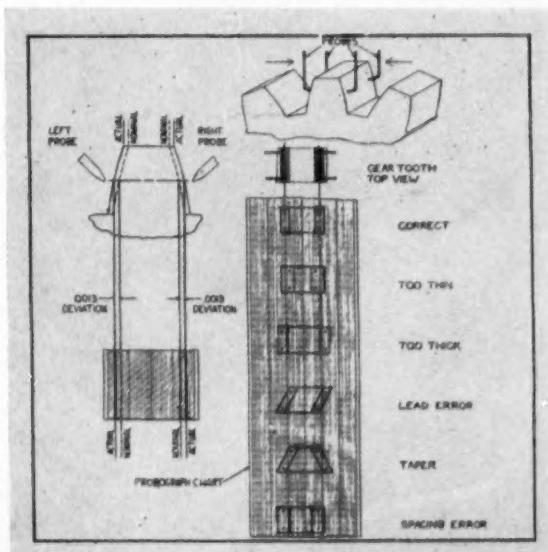
the form of dots on graph paper. The gear is held between centers, the measurements are taken with the gear at stand-still, and the gear is indexed to the next tooth after each group of measurements has been taken. The graph paper record shows whether the selected points of each tooth are where they are supposed to be or, if not, the extent and direction of the deviations. Such a chart not only contains information about each gear tooth but, inasmuch as it contains the coordinated information of all gear teeth on the same chart, it shows the peculiar deviations caused by eccentricity, wobble, misalignment, etc., of the "gear as a whole" in a clear and self-explanatory way.

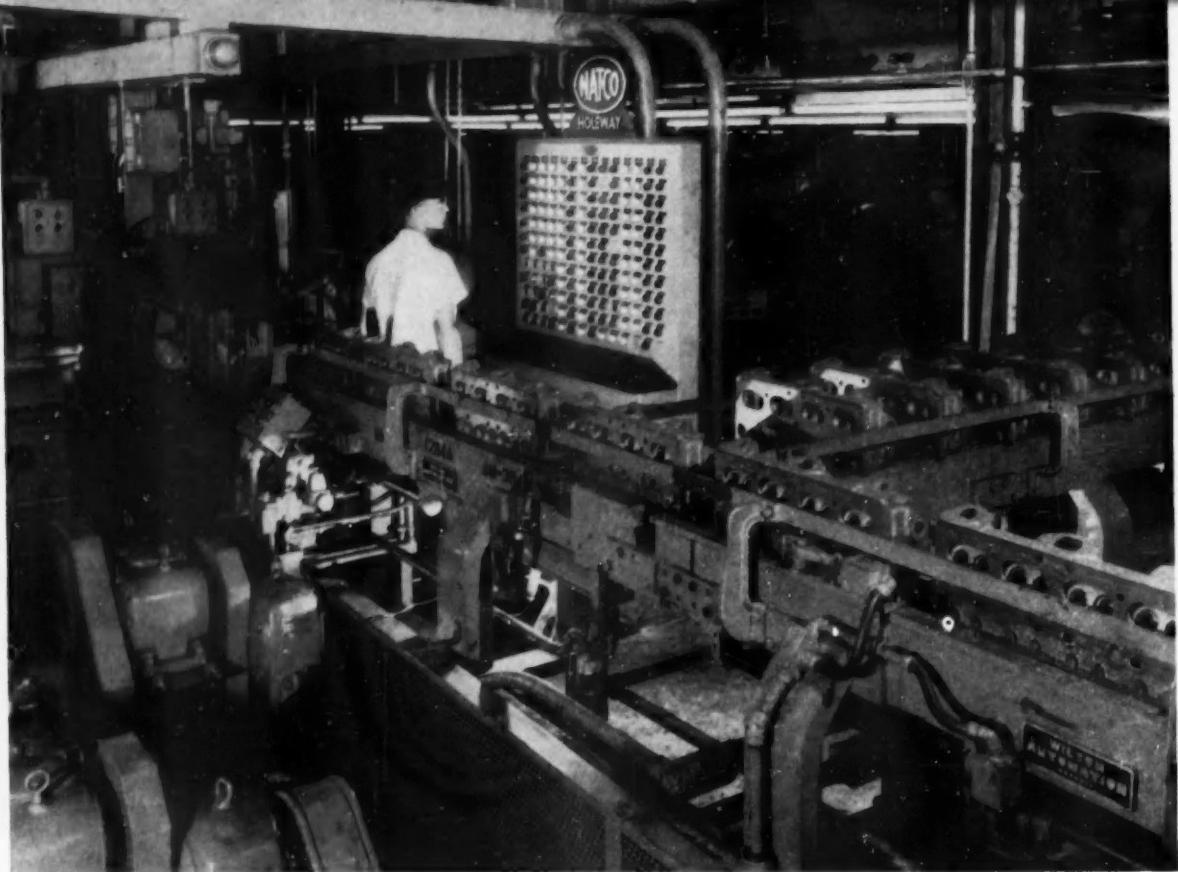
Simple gears, such as spurs, require fewer measuring points to define their characteristics, and are

(Turn to page 116, please)

Fig. 3

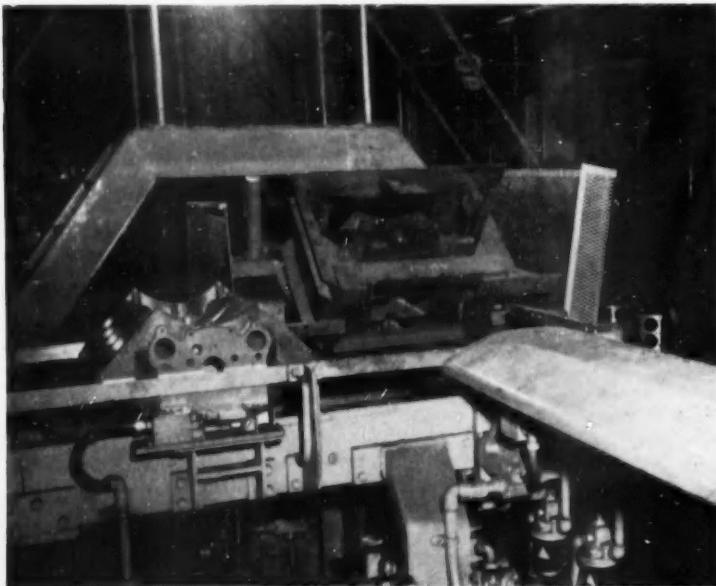
**Warner & Swasey Probograph dimensional measuring method of checking gears.**





Wilson automation is used to transport the heads into a Natco unit for processing.

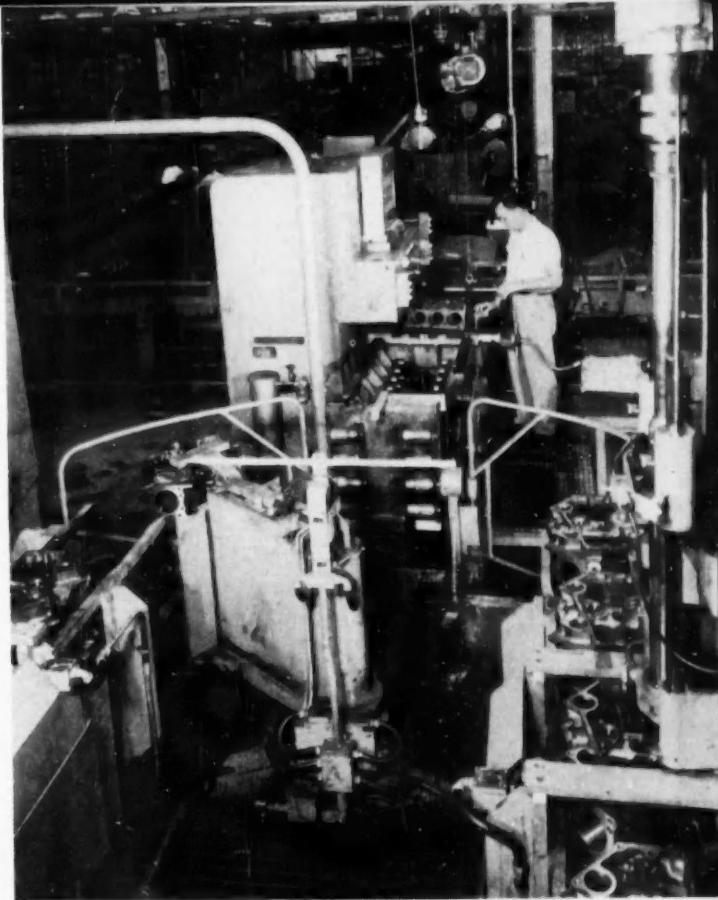
## Machine Tool Automation for Pontiac



One of several Wilson automation devices used to convey the block between production machines. This unit turns the block 180 deg vertically and moves it at right angles to the next operation.

**A**UTOMATION and modern high-speed machine tools have been combined for the production requirements of the new overhead-valve Pontiac V-8 engine. Retooling for the 287.2 cu in. displacement engine was done at a cost of many millions of dollars, since practically all of the equipment utilized for the old in-line engines was not applicable for V-8 manufacture.

Chip conveyors have been installed throughout the machining lines and all machines have been vented for the removal of cast iron dust. A feature along the head and block production lines is the use of Cross tool boards for many of the transfer machines. These boards have sharp preset tooling available for immediate installation when the working tools no longer are capable of meeting inspection tolerances. Instrumentation on the tool board indicates and records the number of work-pieces machined by each tool. When a predetermined number have been completed by any tool, a pilot light is turned on which indicates time for a change. Most of the cutting tools are carbide. Some high speed



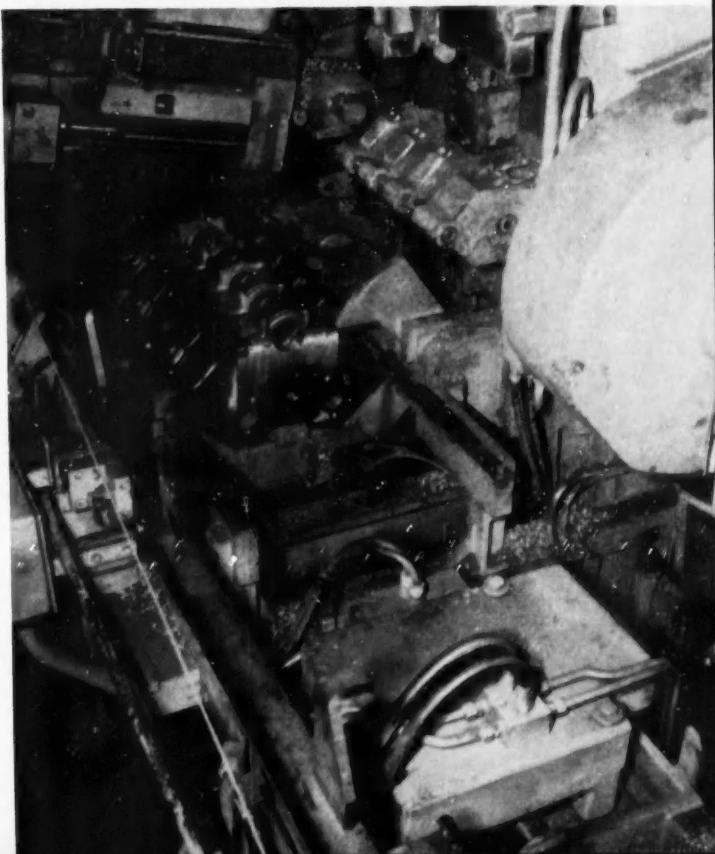
From the Micromatic hones, the block is moved by a unique automation device to the Sheffield gaging equipment which checks out the cylinder, camshaft and main bearing bores.

After the bearing caps are installed, the main bearings and the camshaft bearings are inspected and bored in type of setup below.

## V-8 Production

steel drills are, however, the exceptions.

Pontiac has set up two lines for the machining of the new block. Both are similarly equipped with transfer machines and Wilson automation devices between production units. The first machining operations on the block, after it has been qualified, are performed in a 10-station Ingersoll. Four locating spots on the banks are milled in the initial production step. The block then proceeds through a 180-deg turnover fixture so that the half crank bearings can be bored and the rear camshaft bearing can be reamed. Moving along with the bottom up, it passes under several milling cutters at three successive stations for the rough, semi-finish, and finish milling of the pan rail face. Next, 10 holes are drilled, chamfered, and reamed for screws which hold the bearing caps. Two 0.75 in. diam dowel holes undergo similar operations. The pan rail face is then automatically inspected



and the part is unloaded to a conveyor which carries the workpiece to the next machine.

With the block located by means of the two dowel holes previously machined, the first manufacturing operation in the second 10-station Ingersoll is the milling the front end of the crankshaft main bearings. This is followed by milling the rear of the main bearings and then milling out the bearing notches which are 0.1875 in. wide and 0.060 in. deep using a 2.120 in. diam cutter. Since the notches are a critical point in the manufacture of the block, they are inspected at the next transfer station. Turning the block right-

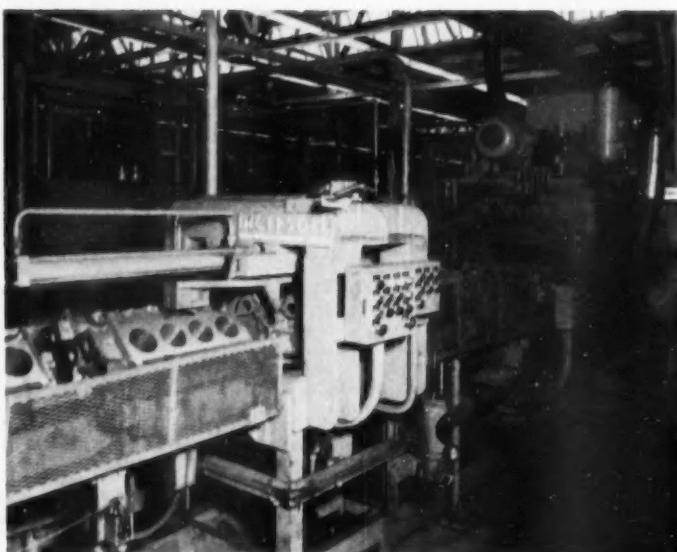
side-up again by means of a 180-deg turnover, the top radius and oil filter pad are then machined. Subsequently, in this machine, the cylinder banks are rough and semi-finish milled and the cylinder bores are roughed out.

Blocks are then loaded and turned 90 deg horizontally in an 18-station Ingersoll. This machine is used for rough and finish milling the ends, drilling all holes in each end, and drilling oil gallery holes. During the course of operations in this unit, chips are blown out and the holes in each end of the workpiece are inspected. The oil gallery holes are checked for leaks and those not meeting quality control specifications are automatically rejected.

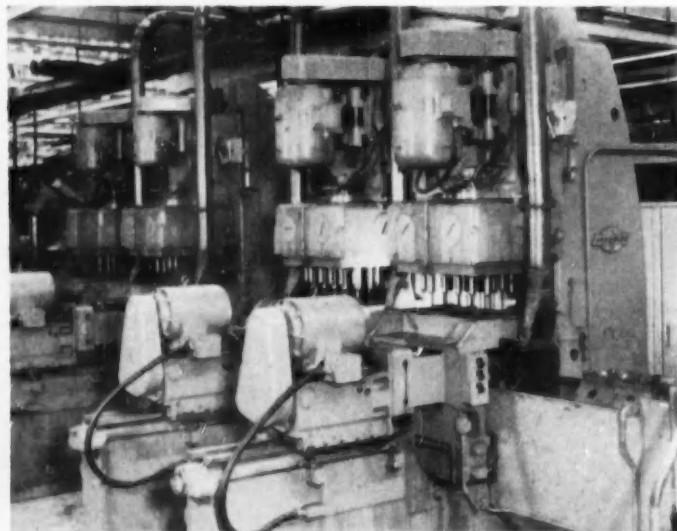
At this manufacturing point the block is loaded with the pan rail up and the front end leading into a huge 25-station Greenlee. This machine drills, reams, and chamfers all holes from the pan rail side. The initial operation is the tap drilling of screw holes for the main-bearing caps. Rough boring operations are carried out on the Welsh plug holes. Also the main bearing oil galleries are finish machined during the production cycle. At the thirteenth station the part is turned 360 deg vertically for chip removal. Following ensuing machining operations, all holes which will subsequently be tapped are checked for depth and the workpiece is then turned 180 deg so that the pan rail is down. The distributor hole is drilled for the upper and lower shaft surfaces. It is then semi-finished by boring and finally the distributor pad is spotfaced.

Continuing along the line, the block is loaded into a 27-station Greenlee for drilling, reaming, and chamfering operations in the top and banks. All tappet holes are drilled; 26 holes in each cylinder bank are drilled, and the part is then rotated 360 deg for chip removal. After drilling and chamfering miscellaneous holes, the tappet holes are rough reamed. At the next-to-last station of the machine, all holes which must be eventually tapped are inspected for proper depth.

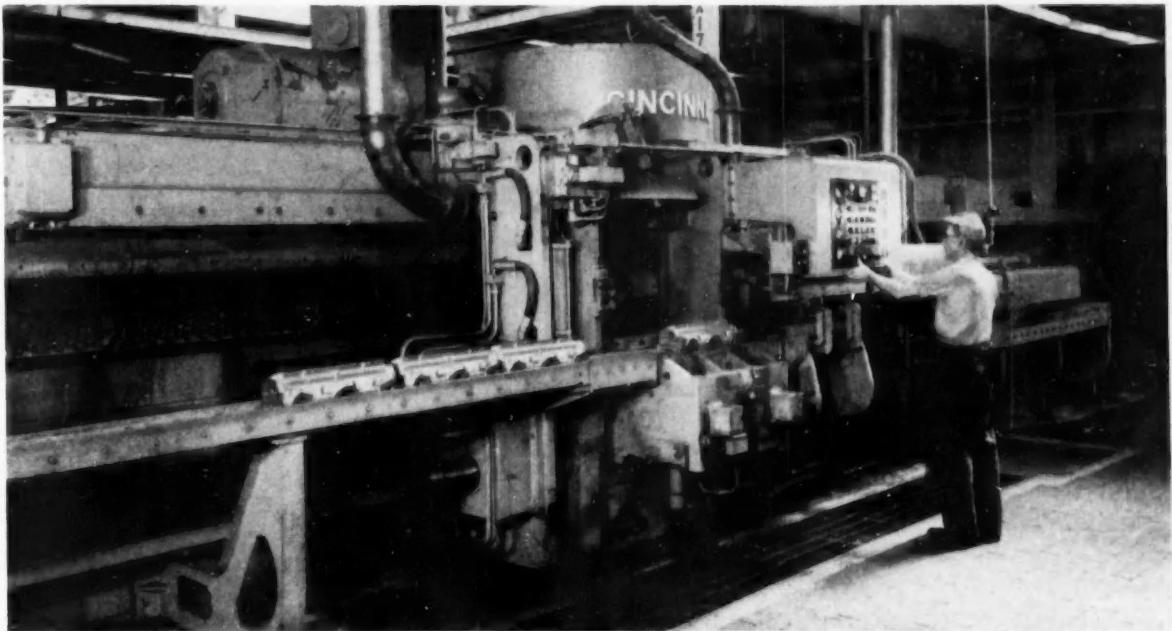
For the final operations on the bare block, a 17-station Greenlee transfer machine is utilized. This stage is initiated with the semi-finish reaming of the tappet holes. Ensuing steps on the block are to finish ream the tappet holes, tap 10 holes in each cylinder block, and tap the oil filter pad holes. The part is then turned 90 deg so that the pan rail is to the left-hand side—it had been previously loaded at the first machine-station with the pan rail down and the front end leading. Holes are then tapped for screws which hold the intake



In this Ingersoll, the block is turned 90 deg laterally for machining operations on the front and rear ends.



This Greenlee transfer unit drills, reams, and chamfers all holes from the pan rail side of the block. Note how it is vented to carry off cast iron dust.



Three Cincinnati broaches are used on the head line. Each machine broaches three surfaces on the OHV head.

manifold and main bearing caps. The workpiece is again rotated 90 deg back to its original position, and then, at the next station, it is turned 90 deg so that the flywheel end is on the left-hand side. Miscellaneous holes are then tapped in the front and rear end, and finally the block is inspected.

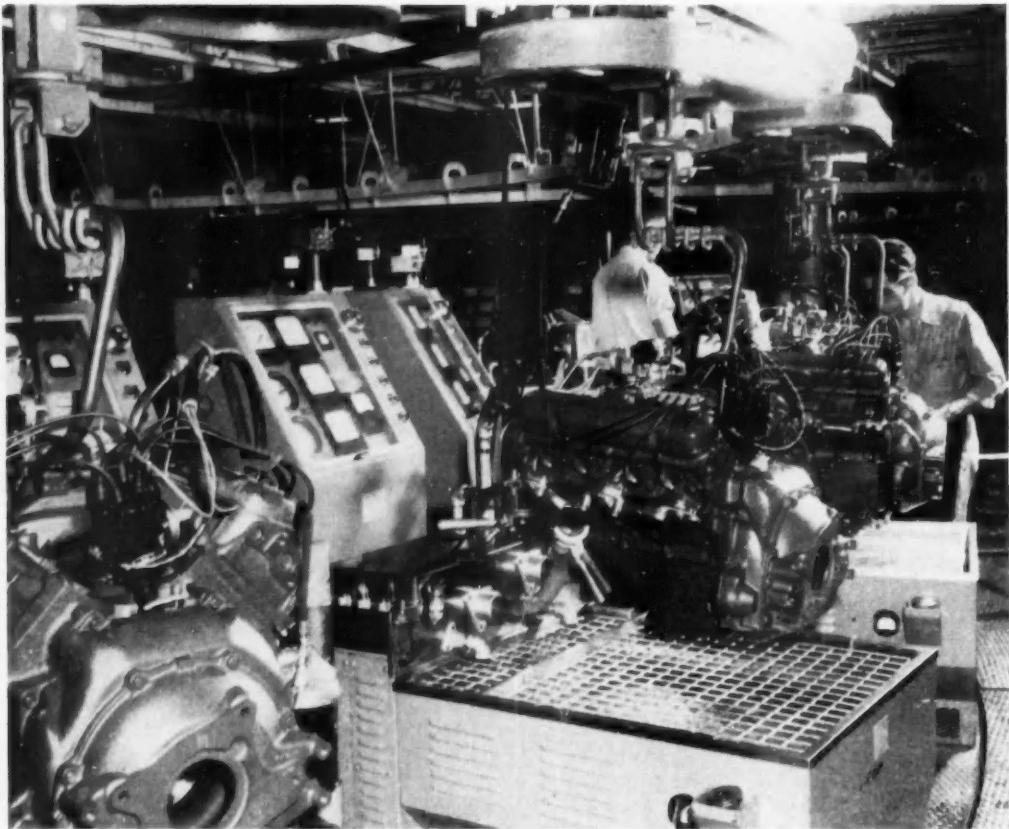
Following a thorough washing in a Centri-Spray unit the bearing caps are assembled to the block by a

Hautau torque machine. It then proceeds automatically to a 14-station Ingersoll primarily for boring operations on the camshaft bearing and main bearing bores. The workpiece is loaded with the pan rail up and the front end leading. At the first work station, it is inspected for clearance for the camshaft and crankshaft boring heads. Any blocks that fail to pass the inspection are automatically rejected at the next station. The first material removal operation is to face the rear of the rear main bearing and cap. Following this step, the rear main is counterbored and four camshaft bearing holes are rough bored. Next, the chips are removed, the cam and crank holes are semi-finish bored, and the oil slinger grooves are rough and finish turned. After facing off and chamfering the thrust bearing, chips are dumped from the workpiece. The subsequent phase is the second semi-finish boring operation on the main bearings and the finish boring of the camshaft bearing holes. Once again the chips are removed and the block proceeds to another Ingersoll.

Camshaft babbitt liners are pressed in place during the initial operation in the 10-station Ingersoll. These are then finish bored along with the mains and the distributor hole. The assembly is turned 180 deg so that the top side is up for operations on the cylinder banks which are finish milled. Banks are then inspected



One of the many Cross tool control boards used throughout the head and block lines for the transfer machines.



Pontiac now has its engine test operations completely automated with two merry-go-round type test stands. Each stand has 23 test beds for checking out the engine after final assembly operations.

and the top and bottom of the bore is chamfered. The next two stations semi-finish and finish bore the eight cylinders with each station accepting only every other block.

Cylinder bores are rough and finish honed holding a tolerance of plus or minus 0.00025 in. in Micromatic machines. Similarly, the main bearings are honed in Micromatic units. Here a tolerance of plus or minus 0.0005 in. is held. Sheffield air gaging equipment is then used to thoroughly inspect the cylinder, crank-shaft bearing, and camshaft-bearing bores. A very unique piece of automation equipment—built by Wilson—is used to pick the block off the hone line, transport it in a 90 deg arc, and deposit it on the conveyor integrated with the Sheffield gaging apparatus. From the inspection station, the blocks are washed in a Centri-Spray, Welch plugs are inserted, the water chamber is air tested, lugs are milled off, and it is sent to assembly.

Three Cincinnati broaches powered by a 75 kw GE motor-generator set are used for the initial metal removal operations on the V-8 heads. Each machine broaches three surfaces on the head—the joint face, exhaust manifold face, and intake manifold face. The production lines then widens out from three to four for the second series of operations on the heads.

Nateco transfer machines of 33 stations each perform a multiplicity of milling, drilling, and reaming

operations on the workpiece. Cross tool boards are used along with the machines for proper tool control. After the part is loaded, it is tilted into position for milling the ends and for drilling eight holes in the bottom. The head is then tilted back into position so that machining can be performed on the pushrod holes, stud holes, and valve cover fastener holes. Four of the holes drilled previously are then checked for depth and location. Combustion chambers are next rough milled, valve throats are core drilled, and the spark plug holes are drilled, counterbored, and chamfered. Valve guide holes are drilled out to  $\frac{1}{2}$  depth subsequent to rotating the part to remove chips. Valve spring seats are spotfaced, five water holes are drilled, and two dowel holes are reamed at the ensuing station. Following the machining phase, the left-hand head of the machine checks 21 holes for depth while the right-hand head inspects the valve guide holes. In the following operation, the valve guide holes are rough reamed and the pushrod holes are slotted. Chips are dumped from the workpiece before it proceeds to two successive inspection stations. The first checks two dowel holes for diameter only and the second inspects the four sparkplug holes for depth and the two dowel holes for spread. A compound fixture is used to rotate the part 90 deg and to turn it 90 deg for unloading.

Another Nateco transfer type machine is used for  
(Turn to page 110, please)

# DEVELOPMENT OF THE New Sealed Beam Headlamps

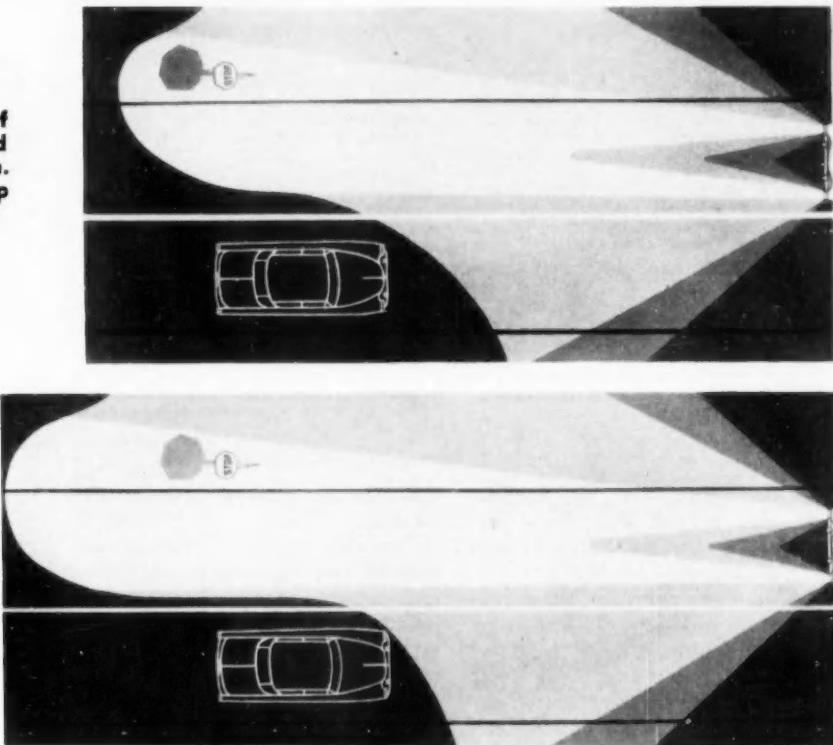
Greater seeing distance of new headlamp is illustrated here in the diagram at bottom. Upper diagram is headlamp used at present.

THE new sealed beam headlamp (see AUTOMOTIVE INDUSTRIES, Nov. 1, page 33), which automobile and truck manufacturers hope to adopt as standard equipment some time during the first half of 1955, has an interesting history. Its development can be attributed primarily to the fact that night driving conditions have changed significantly during the past 15 years.

The number of motor vehicles in the U. S. has doubled since World War II. As a result, the average driver at night must keep his headlights depressed for oncoming vehicles much more of the time than was the case when the present type of sealed beam lamp was introduced in 1939.

The main objective of a cooperative industry headlamp improvement program, initiated by the Engineering Advisory Committee of the Automobile Manufacturers Association in September, 1950, at the request of the Engineering Committee of the American Association of Motor Vehicle Administrators, was to increase the seeing distances provided by the lower beam. Responsibility for the program then was assigned to the AMA's Vehicle Lighting Committee, composed of engineering representatives from the various vehicle manufacturers. Actual engineering development work was delegated to a special subcommittee of engineers from five producers of motor vehicle headlamps—Electric Auto-Lite Corp., General Electric Co., Guide Lamp Div. of General Motors Corp., Tung-Sol Electric, Inc., and Westinghouse Electric Corp.

Research, design, experimental lamp construction,



and testing were carried on cooperatively by the participating manufacturers. During the course of the development program, 11 experimental designs were submitted and tested. In addition to receiving a series of tests by the company which created it, each trial lamp passed through evaluation tests by the two committees and road checks by the individual vehicle manufacturers.

After agreement had been reached in the two working committees on the specifications for a lamp having the desired performance characteristics, each lamp company submitted sample units to the AMA Engineering Advisory Committee. The proposed lamps then were submitted to the AAMVA Engineering Committee, and finally to the entire AAMVA for approval.

Basically, the new design effects a great improvement in lower beam illumination. Primarily involved are increased current to 40 watts from 35, an opaque shield over the filament, and optical changes brought about through redesign in lens and reflector to diminish stray beams of light upward. The slightly higher

(Turn to page 118, please).

# How Freight Rate Adjustments Affect

## CADILLAC PRICES\*

	1955	1954
Series 62 coupe .....	\$3,568	\$3,525
Coupe de Ville .....	3,964	3,921
<b>Fleetwood Series</b>		
60 Special sedan .....	4,342	4,299
Eldorado .....	5,813	5,300
Series 62 sedan .....	3,657	3,614
Convertible .....	4,097	4,051
<b>Fleetwood Series</b>		
75 sedan .....	5,694	5,401
<b>Fleetwood Series</b>		
75 Imperial Limousine .....	5,895	5,602

\* Factory list prices, excluding excise taxes and handling charges.

## CHRYSLER PRICES\*

	1955	1954
Windsor Deluxe .....	\$2,452	....
Nassau (hardtop coupe) .....	2,812	2,800
Convertible coupe .....	2,812	2,800
Six-passenger sedan .....	2,412	2,350
Newport (hardtop coupe) .....	2,559	2,600
<b>New Yorker Deluxe</b>		
Newport (hardtop coupe) .....	3,332	3,410
Convertible coupe .....	3,585	3,625
Six-passenger sedan .....	3,185	3,155
St. Regis (hardtop coupe) .....	3,367	....
<b>Imperial</b>		
Six-passenger sedan .....	4,105	3,925
Newport (hardtop coupe) .....	4,325	4,205

\* Factory list prices, excluding excise taxes and handling charges.

## DODGE PRICES\*

	1955	1954
Coronet 6 .....	\$1,838	\$1,923
Two-door sedan .....	1,912	1,958
<b>Coronet V-8</b>		
Four-door .....	2,068	2,059
Lancer hardtop .....	2,087	....
<b>Royal V-8</b>		
Four-door sedan .....	2,114	2,178
Lancer hardtop .....	2,193	....
<b>Custom Royal V-8</b>		
Four-door sedan .....	2,265	....
Lancer hardtop .....	2,330	....
Lancer convertible .....	2,521	....

\* Factory list prices, excluding excise taxes and handling charges.

THE adjustment of freight rates by the Big Three car manufacturers, the first such move in industry history, has resulted in lower prices on some cars and higher on others. In actuality, the new freight charge formula does not represent a profit or loss to the manufacturers themselves, but equalizes shipping charges to distant points.

Ford was the first to announce a freight reduction program, and was

followed by General Motors and Chrysler. While there are slight differences in the new freight structure of each of these manufacturers, all are similar in that they greatly reduce delivered price differentials between home plant cities and distant points. In the past, full rail freights from home factories were added to the price of the car at the delivery point, regardless of whether the car had been assembled in the home factory

or at a nearby assembly plant. Since American Motors and Studebaker-Packard are not unveiling their 1955 automobiles until the beginning of the year, prices have not yet been released on their car lines. Chevrolet and Pontiac (see AUTOMOTIVE INDUSTRIES, Nov. 15, p. 182) were the first to announce their prices.

Chevrolet boosted its prices up to \$62 above comparable 1954 prices on six-cylinder models. Pontiac

## BUICK PRICES\*

	1955	1954
Special Series .....	\$2,090	\$2,064
Four-door sedan .....	2,369	2,343
Two-door conv. coupe .....	2,128	2,102
Two-door sedan .....	2,035	2,009
Four-door estate wagon .....	2,726	2,900

**Century Series**

Four-door sedan .....	2,315	2,288
Two-door conv. coupe .....	2,727	2,700
Two-door Riviera coupe .....	2,364	2,337
Four-door estate wagon .....	2,899	3,172

**Super Series**

Four-door sedan .....	2,621	2,591
Two-door conv. coupe .....	2,945	2,915
Two-door Riviera coupe .....	2,578	2,548

**Roadmaster Series**

Four-door sedan .....	3,047	3,017
Two-door conv. coupe .....	3,234	3,204
Two-door Riviera coupe .....	3,144	3,114

\* Factory list prices, excluding excise taxes and handling charges.

## PONTIAC PRICES\*

	1955	1954
860 Series .....	\$2,264	\$2,105
Four-door sedan .....	2,105	2,046
Four-door sta. wagon .....	2,518	2,459
Two-door sta. wagon .....	2,434	2,375

**870 Series**

Four-door sedan .....	2,268	2,209
Two-door sedan .....	2,209	1,150
Catalina .....	2,335	2,386
Four-door sta. wagon .....	2,603	2,544

**Star Chief De Luxe**

Four-door sedan .....	2,362	2,303
Convertible .....	2,691	2,632

**Star Chief Custom**

Four-door sedan .....	2,455	2,396
Catalina .....	2,499	2,558

\* Advertised delivered prices at Pontiac, Mich., which include dealer handling, factory handling and Federal taxes.

## CHEVROLET PRICES\*

	1955	1954
150 Series .....	\$1,685	\$1,623
Two-door sedan .....	1,728	1,680
Four-door sedan .....	1,593	1,539
Utility sedan .....	2,030	2,020
Two-door sta. wagon .....	2,079	1,782

**210 Series**

Two-door sedan .....	1,775	1,717
Four-door sedan .....	1,819	1,771
Four-door sta. wagon .....	2,127	2,133
Delray coupe .....	1,835	1,782
Two-door sta. wagon .....	2,079	1,782

**Bel Air Series**

Two-door sedan .....	1,888	1,830
Four-door sedan .....	1,932	1,884
Four-door sta. wagon .....	2,262	2,283
Convertible .....	2,206	2,185
Sport coupe .....	2,067	2,061

\* Advertised delivered prices at Flint, Mich., which include dealer handling, factory handling and Federal taxes.

# 1955 New Car Prices

## OLDSMOBILE PRICES\*

Series "88"	1955	1954
Four-door sedan	\$2,151	\$2,126
Two-door sedan	2,090	2,060
Holiday coupe	2,255	2,230

### Super "88"

Four-door sedan	2,277	2,252
Two-door sedan	2,215	2,189
Holiday coupe	2,474	2,448
Convertible coupe	2,640	2,615

### Series "98"

Four-door sedan	2,578	2,552
Deluxe Holiday coupe	2,797	2,771
Starfire (convertible)	2,989	2,963

\* Factory list prices, excluding excise taxes and handling charges.

By  
Leonard  
Westrate

transmissions and power steering.

Ford boosted prices on 10 of 12 comparable 1954 models from \$19 to \$64. Only cuts of from \$6.93 to \$33.86 appeared on the station wagons. The company set a price of \$99.98 extra for the 162-hp, V-8 engine, and \$137.48 for the 182-hp, V-8 plant. However, the price of power steering was cut to \$91.40, down \$43 under the 1954 unit, while the cost of the automatic transmission went down \$5 to a new price of \$178.20.

In making its bid to regain at least 20 per cent of the industry market in 1955, Chrysler Corp. reduced 16 of its models \$3 to \$320, but raised eight by \$5 to \$180. The biggest reductions were made by De Soto, which slashed the list price on the Firedome Series from \$125 to \$320. However, actual prices will vary, as with GM and Ford, because of the new freight structure.

Dodge was the only Chrysler division which reduced the factory list price on all its models with cuts ranging from \$46 to \$106. Five Chrysler models were increased in

## FORD PRICES\*

Mainline (Six-Cyl.)	1955	1954
Business sedan	\$1,605	\$1,569
Four-door	1,753	1,721
Two-door	1,707	1,672

### Customline

Two-door	1,800	1,764
Four-door	1,844	1,814

### Fairlane

Club sedan (two-door)	1,913	...
Town sedan (four-door)	1,959	1,919
Victoria	2,094	2,075
Crown Victoria	2,202	...
Crown Victoria (trans-parent top)	2,271	...
Sunliner	2,204	2,185

### Station Wagons

Ranch wagon	2,043	2,050
Custom ranch wagon	2,108	2,142
Country sedan—six pass.	2,156	...
Country sed.—eight pass.	2,287	2,223
Country Squire	2,391	2,359

\* Factory-delivered prices, including excise tax and handling charges.

tagged a flat \$59 increase on all models in the Star Chief and 870 series, except Catalinas which were cut \$51.

Buick an' Cadillac followed later; the former announced an increase on 13 comparable 1954 models from \$26 to \$30. Cadillac boosted its prices on the Eldorado, seven-passenger sedan, and limousine. Buick was the only one of the five GM divisions that cut prices on station wagons. Oldsmobile was the only one which increased list prices of all its 1955 models, in amounts ranging from \$25 to \$30. Substantial reductions were made by most of the automobile makers on automatic

price, and two were cut, while Plymouth reduced three models from \$3 to \$39 and increased three from \$5 to \$14.

Plymouth left the price of one of its models — the six-cylinder Plaza Club Sedan — the same as last year's model.

Chrysler Corp. price cuts on equipment include: Plymouth — automatic transmission down \$10 to \$165, and power steering, down \$35 to \$90; Dodge — automatic transmission down \$10 to \$165, power steering, down \$20 to \$105, and air conditioning down \$70 to \$525; and De Soto — power steering down \$25, and air conditioning down \$70.

## PLYMOUTH PRICES\*

Plaza "6"	1955	1954
Business coupe	\$1,490	\$1,480
Club sedan	1,582	1,582
Four-door sedan	1,622	1,617

### Savoy "6"

Club sedan	1,674	1,682
Four-door sedan	1,714	1,717

### Belvedere "6"

Club sedan	1,766	...
Four-door sedan	1,806	1,792
Sport coupe	1,931	1,970

\* Factory list prices, excluding excise taxes and handling charges.

## DE SOTO PRICES\*

Firedome	1955	1954
Four-door sedan	\$2,268	\$2,453
Special coupe	2,308	2,423
Sportsman	2,413	2,685
Convertible	2,571	2,891

### Fireflite

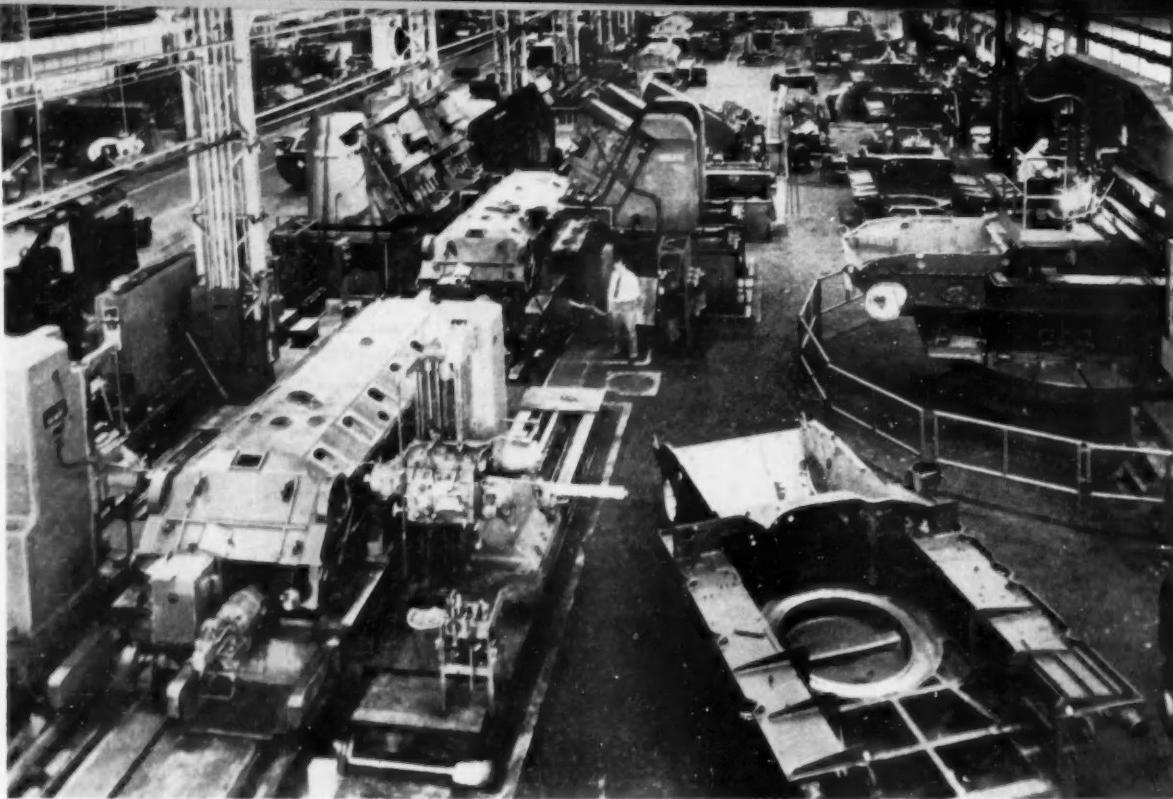
Four-door sedan	2,481	...
Sportsman (hardtop)	2,678	...
Convertible	2,875	...

\* Factory list prices, excluding excise taxes and handling charges.

## IHC Branch Buys Jowett Facility in England

Jowett Cars, Ltd., one of Britain's oldest automobile manufacturing firms, has sold its Bradford, England, plant to the British branch of International Harvester Co.

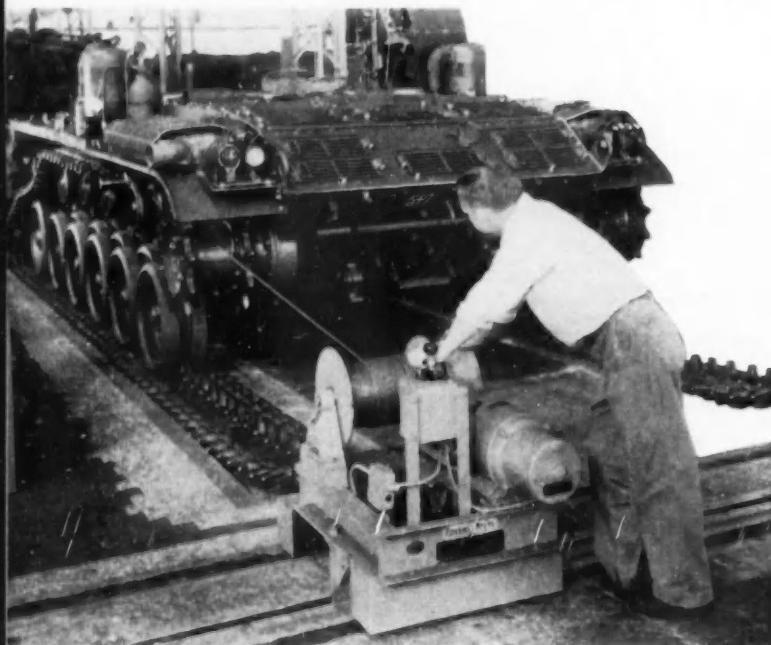
The new management will take over on Oct. 25, and will make tractors and farm machinery. Arrangements have been made to continue production of Jowett's two-seater Jupiter sports car, the only model now being made by the company.



Perspective of machining bay, showing line-up of big Wean equipment at the left; and 25-ft Niles boring mill on the right.

## SPECIAL EQUIPMENT FOR MAKING

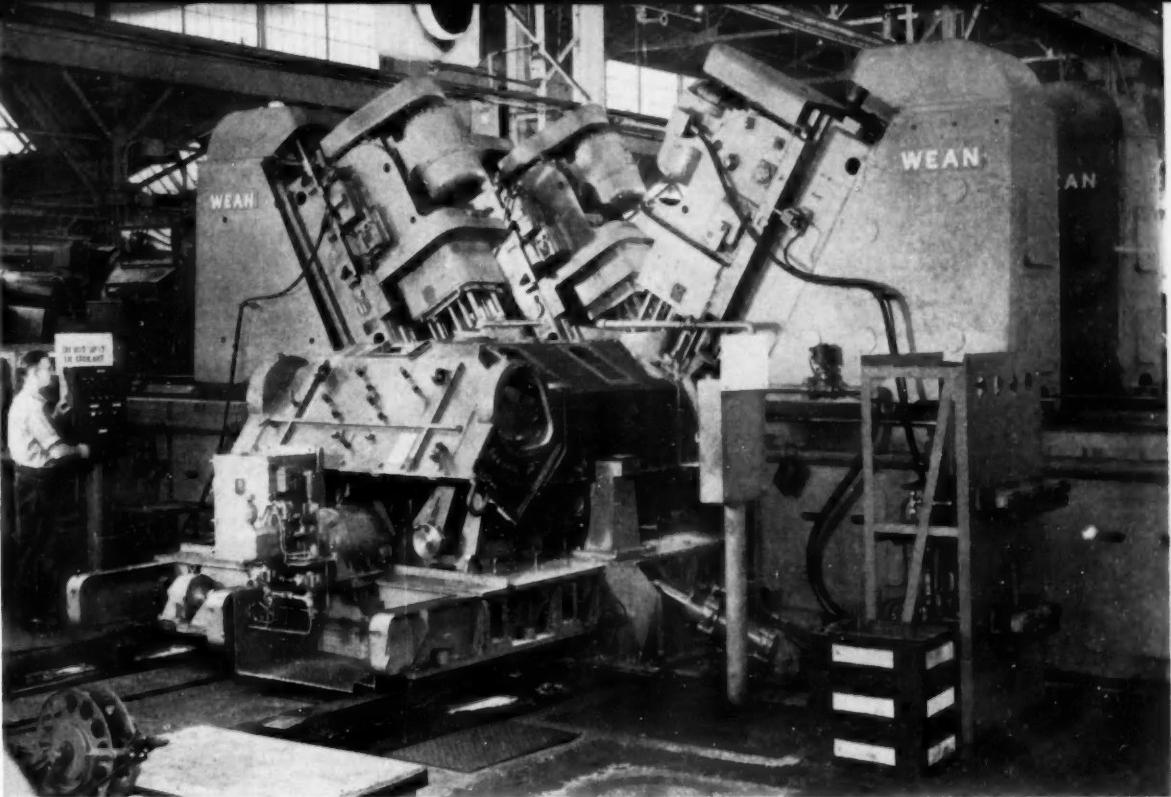
# *Self-Propelled Howitzer*



SOME months ago Army Ordnance took the wraps off its newest mobile weapon—the M44 self-propelled 155-mm howitzer. This enormous full-tracked armored combat vehicle is made by Massey-Harris-Ferguson, Inc., Racine, Wis., in a separate building entirely isolated from its tractor and farm machinery operations.

What is particularly noteworthy from the standpoint of production management is that by skillful advance planning and by allocating certain specialized jobs, such as fabrication of the hull and gun mount to competent sub-contractors, the company succeeded in housing the entire assembly

Here is the winch mechanism for installing the track. As seen here, the Robbins & Myers winch traverses the vehicle on the rails to facilitate installation of the track on both sides.



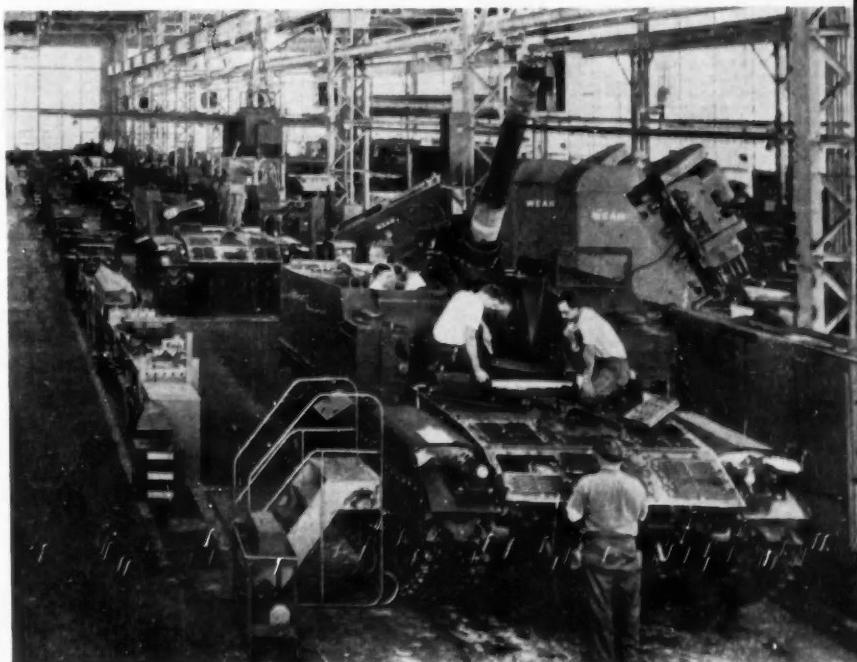
**Close-up of the drilling machine section of the Wean line. It shows how the hull is mounted on the car and transferred through the machine while lifted off its rails.**

associated machining work in a floor space of but 87,000 sq ft. The layout is extremely compact, reducing the path of material and assembly flow, making for most economical operation.

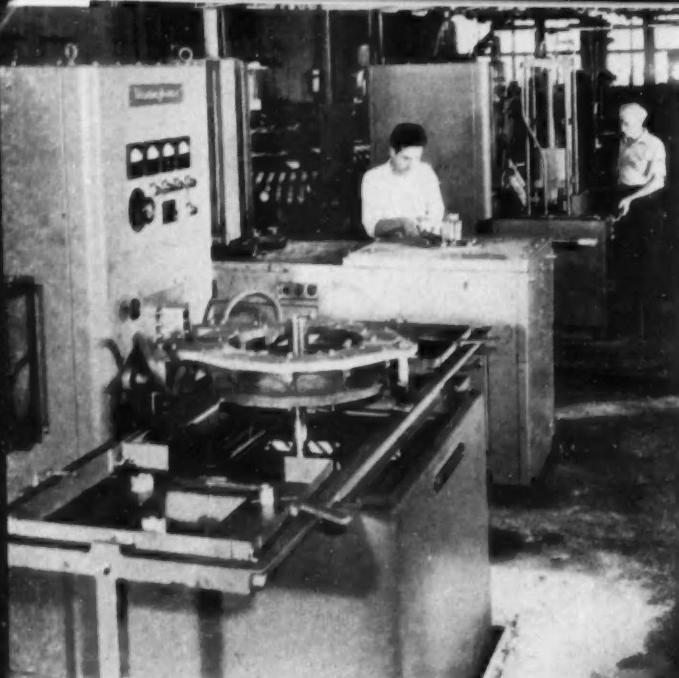
The following is a pictorial outline of some of the interesting highlights without attempting a step-by-step description of the integration of the machine. The backbone of the vehicle is the massive armored hull. This is fabricated by The Heil Co. and delivered to the assembly plant in partially machined state.

Initial major operations occur in the enormous machining bay, shown here in full perspective. Upon acceptance inspection the hull is mounted on a self-propelled car, rolling on rails along the machine line at the left. Each car is driven by an electric motor which is fed power from a third rail. Starting in the far background, the hull enters the

first operation machine—an enormous Wean milling machine with a milling head on each side. Using a single, 21-in. diameter milling cutter, fitted with cemented-carbide blades, the six large angular sus-



**Howitzers are nearing the end of the final assembly line in this view.**



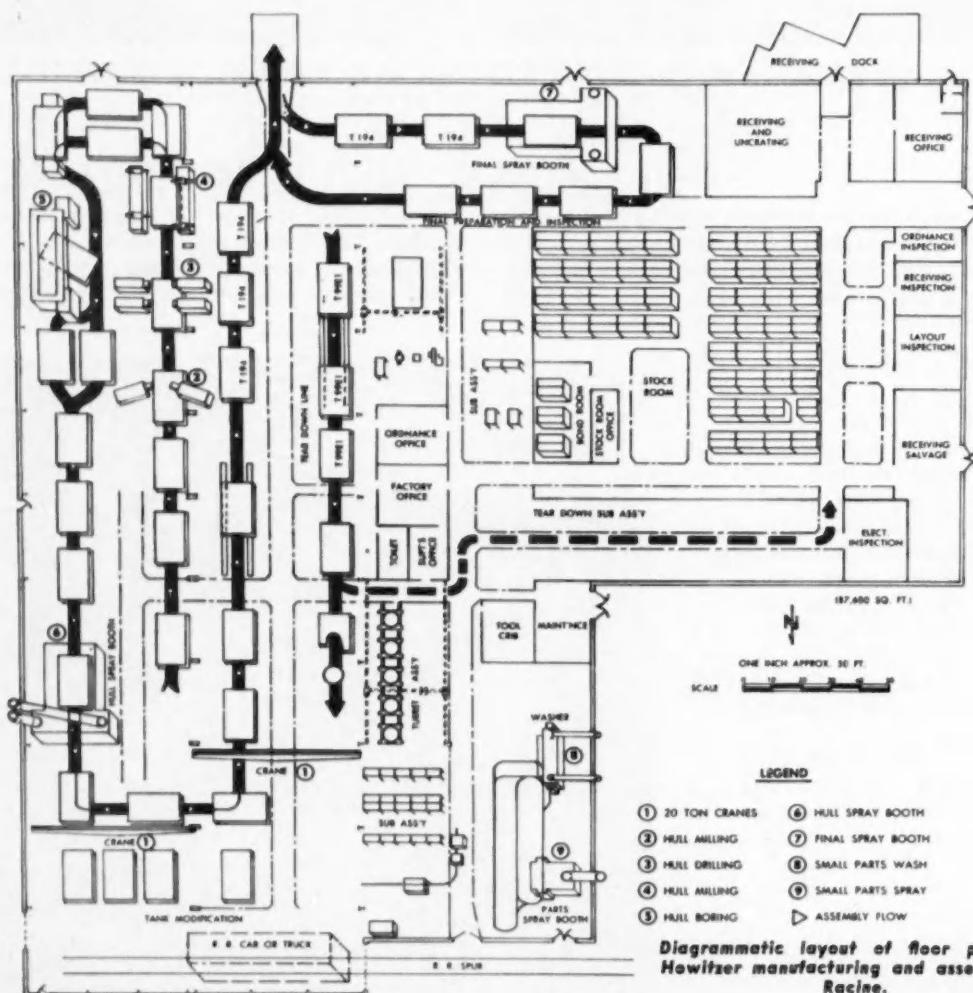
pension pads on each side are finish-milled to size, indexing the work progressively through the work station.

At the end of this operation the hull moves into the second big Wean machine, this one equipped with two multiple spindle, W. F. & John Barnes drilling heads on each side. One pair of heads contains 10 spindles; the other, 11 spindles.

Final operation in this semi-automatic transfer machine line is precision boring in the horizontal Gilbert boring mills at the end of the line

(Turn to page 104, please)

**Scene in corner of tractor gear department.** In the foreground is one of the newly installed Westinghouse induction heating machines, fitted with coils for hardening bull ring gear teeth.



# **Future Designs**

## **AS FORESEEN BY BODY ENGINEERS**

**1955 ASBE**

### **Annual Convention**

#### **List of Exhibitors**

- The Randall Co.**
- Presstite Engineering Co.**
- Owens-Corning Fiberglass Co.**
- Dewy and Almy Chemical Co.**
- Libby-Owens-Ford Glass Co.**
- Stubnitz-Greene Spring Corp.**
- Soss Manufacturing Co.**
- Tinnerman Products, Inc.**
- Engineering Reproduction, Inc.**
- Douglas and Lomason Co.**
- Kish Resin, Inc. and Kish Plastic Prod., Inc.**
- Wood Conversion Co.**
- Pittsburgh Plate Glass Co.**
- The Peanut Co.**
- United Carr Fastener Corp.**
- Robin Products Co.**
- Trico Products Corp.**
- Universal Wire Spring Co.**
- Shakeproof Div. Illinois Tool Wks.**
- U. S. Gypsum Co.**
- American Bosch Corp.**
- American Forging and Socket Co.**
- Textileather Corp.**
- Keuffel and Esser Co. of New York**
- Automotive Rubber Company, Inc.**
- Sprague Devices, Inc.**
- Creative Industries of Detroit**
- Upholstery Leather Group**
- Capitol Engineering and Reproduction Co.**
- U. S. Rubber Co.**
- The Anderson Co.**

**T**HE new car of today was (or should have been) the dream car of 10 or 15 years ago. With this premise, Gordon M. Buehrig, Special Products Div., Ford Motor Co., speculated on the features of the car of 1970, at the opening session of the American Society of Body Engineers in Detroit late in October. He visualized the possibility of some makes with engines in the rear, some with front drive, conceded that most makes would continue as they are now. Similarly, he thought more makes might have unit body-frame construction, although most would continue use of a separate frame.

Buehrig predicted that present methods of designing and engineering auto-bodies would be obsolete by 1970, with new techniques cutting man-hours by 50 per cent. Part of this gain will come from a new type of stylists, men with basic engineering training.

The success of present day motor car designs was attributed to the teamwork of stylists—art and color experts—and body engineers, each one complementing the talents of the other. According to W. L. Mitchell, director GM Styling Section, such teamwork has produced the advanced products now going to market, and will effect still further progress in the future.

The opening session of the ASBE annual convention highlighted the unique contribution of this independent organization now grown to full stature. There is little question that stylists and engineers concerned with body design have acquired new status and recognition through participation in the work of this young society.

One of the regular features of the annual meeting is the exhibition, this year featuring the products of some 31 well-known suppliers. Here and there the exhibits uncovered new developments of interest to the industry at large. For example, Dewey and Almy displayed the Darex Flowed-in gasket technique, marking a fresh approach to industrial gasketing. Here the gasket material, in liquid form, is applied directly to the product by means of an automatic or semi-automatic machine.

Stemming from over eight years of research, U. S. Rubber showed its Crest Air seat cushion, a handsomely tailored seat assembly employing individual compressed air bags instead of springs. The assembly is built from Koylon-Foam, mounted on a wood frame. One of the attendants mentioned that this type of seat back and cushion construction would be offered as an extra cost option on some 1955 trucks.

Only a few years back designers were faced with the difficult problem of wiping curved windshield glass. Having solved that problem, they promptly proceeded to the wrap-around windshield that dominates 1955 cars. One solution to the new problem was described in a paper by John W. Anderson, displayed in The Anderson Co.

*(Turn to page 114, please)*

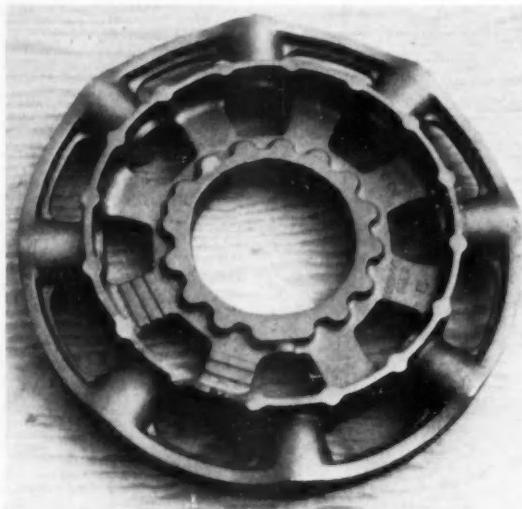
# Proper Foundry Practices for Stainless Alloy Castings

A technical conference, recently sponsored by the Cooper Alloy Foundry Co., Hillside, N. J., was devoted to proper foundry practice when stainless alloys are utilized for castings.

The large group of engineers in attendance was first shown through the Cooper Alloy plant to familiarize them with the foundry's operation. Following the tour, four papers were presented by engineers of the sponsoring company. The first paper, presented by H. J. Cooper, executive vice president, and N. S. Mott, chief chemist and metallurgist, was on the newer cast stainless alloys. The authors discussed in detail two rather new precipitation hardenable stainless steel alloys which combine excellent corrosion resistance with high strength, hardness, and galling resistance. These properties are produced by simple low temperature heat treatment. The first alloy is Armco 17-4 PH which uses copper as a precipitation hardening element. The second is Cooper Alloy V2B which uses beryllium as the hardening agent. Mr. Cooper and Mr. Mott pointed out that both alloys can be cast into a wide variety of shapes. Cost and corrosive resistance requirements must be considered in the selection of the proper alloy.

J. L. Lessman, foundry superintendent of Cooper Alloy, spoke on designing sound castings in stainless steel. He stated, that due to high pouring temperatures and the nature of the stainless alloys, high liquid contraction or shrinkage takes place requiring very high risers or feed heads. To combat this, according to Mr. Lessman, it is desirable to design castings with a V feed. The section should be gradually tapered to the feed source so that no localized hot spots occur and that every increment in the system gradually becomes larger, working toward the reservoir of hot metal or riser.

An interesting paper on shell molding was read by S. B. Donner, general foundry foreman of Cooper



Jet engine support ring cast by the shell molding process. The alloy used in this ring contains approximately 20 per cent chromium and 15 per cent nickel.

Alloy. He spoke primarily of the quality advantages which can be obtained with shell molding and with some of the design and economic considerations of the process. One of the items which Mr. Donner stressed very strongly was the casting tolerances of shell molded products. He stated that it is the belief of Cooper Alloy that narrow blanket tolerances cannot and should not be ordinarily quoted for steel castings. The innumerable design factors both of the mold and the casting, solidification characteristics of the alloy involved, the

method of pouring and the casting temperature, are just some of the items which affect the reproducibility of dimension. As an example, he mentioned the tendency of shell molded castings to increase in size at right angles to the parting line of the mold.

Mr. Donner stated that shell molding should be considered when there is a possibility of eliminating some machine operation. Also, if there is a need for thinner sections, small cored holes, well detailed contours, minimum draft, or intricate pockets in the casting design. The method should also be considered if weight reduction is desired, and if there is a need for a better surface finish than that which can be obtained by conventional practice. He also brought out that shell molding is particularly adaptable when there is a need for the qualities of high alloy steel rather than the low melting point alloys.

An example of shell molding at Cooper Alloy was discussed. The product is a jet engine support ring, approximately 14 $\frac{3}{4}$  in. in diam and two in. thick. The surface finish required is approximately 125 micro-inches rms. These support rings must be 100 per cent perfect under x-ray and Zyglo inspection. This casting requires extremes of quality, and for that reason, all possible precautions are taken in the manufacture of the molds. Every mold is bolted instead of glued;

(Turn to page 102, please)

# HUGE Forging Press Nears Completion



**T**HE first of the gigantic forging presses being built under the U. S. Air Force heavy press program is now nearing completion in the Air Force Plant at Aluminum Co. of America's Cleveland works.

Recently the two heaviest components of the press were lifted into place. The 460,000 lb casting which will form one-half of the moving crosshead of the 50,000 ton press is shown being prepared for lifting.

The hook for the 200 ton crane is being positioned into the special lifting eye on the 30½ ft long cross-head casting.

This 50,000 ton capacity press and a 35,000 ton press will go into full production early in 1955. The 50,000 ton press is being built by Mesta Machine Co., and the 35,000 ton press by United Engineering and Foundry Co.

# *British Show Reflects* **AUTOMOBILE**



Lancaster Sprite four-door sedan which is powered by a 60-hp, four-cylinder engine

**By W. F. Bradley**  
Special European Correspondent  
for AUTOMOTIVE INDUSTRIES



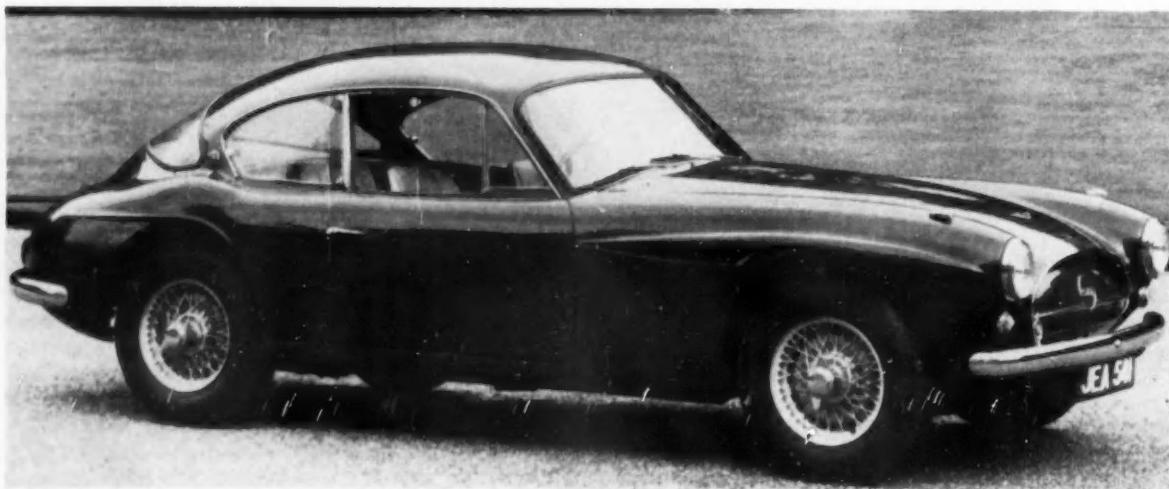
Triumph two-passenger sports car with glass fiber reinforced plastic top

LONDON, ENGLAND

B RITAIN'S 39th International Motor Show, held during the last 10 days of October at Earls Court, indicated the prosperity and recent expansion of the industry but appeared to place more emphasis on marketing than on technical innovations. Sixty-six passenger car manufacturers presented 280 automobiles, while the total number of booths in Earls Court was 538—the highest ever.

There was expansion all along the line. Estimates are that for the full year 1954 passenger car production will be 750,000, compared with 594,808 in 1953, and that

Jensen 541 sports sedan with all-plastic body



The Austin A.90 six Westminster sedan; its six-cylinder, overhead-valve engine develops 85 hp at 4000 rpm

# INDUSTRY EXPANSION

380,000 automobiles will be exported, compared with 302,223 last year. World competition is making it more difficult to hold position on certain markets, there being a loss in exports to U.S.A., Canada, Union of South Africa, British West Indies, Japan and Western Germany, but an increase on the overall picture. This slackening in the demand abroad has enabled the growing demand of the home market to be met more fully. Expansion plans are announced throughout the industry. Ford is embarking on a \$182 million five-year expansion program, which will increase floor space by four million sq ft and very materially step up the present output of 1300 vehicles of all types per day.

Vauxhall (General Motors) has an expansion program involving the expenditure of better than \$100 million during the next five years, which will result in doubling production. The B.M.C. combine, uniting Austin and Morris, but taking in Wolseley, M.G. and a number of subsidiary companies, is beginning to increase output and effect economies of production. Standard is raising \$8,400,000 new capital and Rover is doubling production.

Vauxhall's latest, the six-cylinder Cresta



The London show carried 34 foreign car manufacturers by the side of the 32 British producers. These numbers, however, tend to give a wrong impression, for, as in the case of all other European countries, Britain hedges car imports around with restrictions and limitations. The 18 American and Canadian makers are each allowed to import 12 cars in the year, other than those which are sold for dollars to members of the diplomatic corps or the armed forces. These 12 cars per make are subject to an import duty of 33½ per cent on value, plus freight, plus delivery charges, plus an "uplift" tax, and on the figure thus arrived at a 50 per cent purchase tax has to be paid—this purchase tax is common, however, to all cars sold on the British market. As a result of these taxes, an American car generally costs as much in sterling in England





Morris Cowley four-door, six-passenger sedan

as in dollars in the United States. In other words, the factory price Detroit has to be multiplied by 2.8 to obtain the English retail selling price.

A recent trade convention between England and Germany allows the latter country to import automobiles to the value of \$5,600,000 during the current year. This has opened the door to Mercedes-Benz, which expects to import 400 cars in 1955, to Volkswagen with a greater number of units of lower individual value, to B.M.W., Borgward, D.K.W., and Porsche. France has an allocation of \$1,680,000 for automobile imports. This does not affect Citroen which has maintained an assembly plant in England since 1925 and for several years was under the British obligation to export 75 per cent of total production; it also leaves out the Renault 750 rear engine model, which is a British assembly. The allocation, therefore, has to be shared between Peugeot, Simca, Panhard, French Ford, and the 122 cu in. Renault. Italy has an allocation of \$1,260,000 for the year, thus admitting Fiat which has been shut out since 1939, and the more expensive Alfa Romeo and Lancia models, which have been imported in very limited quantities during the past two or three years.

These agreements do not give general satisfaction. It is pointed out that the customs authorities have the right to assess value, and that to factory price they add freight, an advertising charge and cost of delivery to the distributor's premises. The figure thus arrived at is the basis for purchase tax. The importer has to pay purchase tax immediately the car is landed, whereas the national dealer pays it only on sale. American importers appear to accept the fact that dollars are scarce in England and therefore sales of American cars must be low. Only a year ago the number of imports allowed per firm was down to six. Apparently it is because of this allowance per make that General Motors, Packard and Studebaker all have separate

stands in the show. If grouped there would be only 12 cars for the stand. Ford and General Motors are little affected by the English restrictions, for the Ford is built entirely in England to meet British requirements, and General Motors controls the Vauxhall and Bedford organizations. It was noted that General Motors did not bring in the Opel from Germany, nor was any space given to German Ford cars, although the French company had one model on show. European makers generally are dissatisfied with the regulations which increase the selling price of their cars by about 85 per cent and make it very difficult for them to compete against equivalent British makes. The popular Volkswagen, which is England's most serious competitor on neutral markets, costs \$1680 in its lowest priced version on the British market. Even at this figure the factory price must be in the neighborhood of \$900. On the British market this much-feared Volkswagen is outpriced by Ford, Austin, Morris, Standard and Hillman.

Characteristic of the British industry is the broad range of types being manufactured, the equivalent of which cannot be found in any other country in the world. This is attributable to the export policy inaugurated after the war, which obliged manufacturers to get after foreign markets or go out of existence. By deliberately sacrificing home requirements they promoted the expansion of firms with models which might not have survived stringent postwar economy at home. An example is to be found in extended production of sports cars. There is no country in the world geographically less suited for the use of sports cars than England, for its highways are overcrowded and race tracks are practically non-existent, but no country produces so many.

New models were rare; design changes were not of an important nature and usually the "1955" label  
*(Turn to page 98, please)*

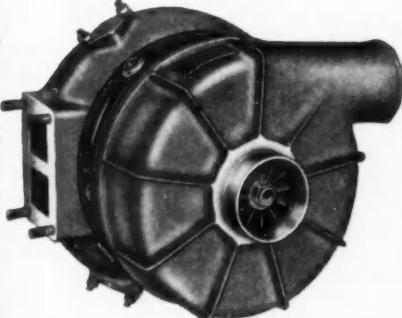


# EXHAUST DRIVEN TURBO CHARGERS

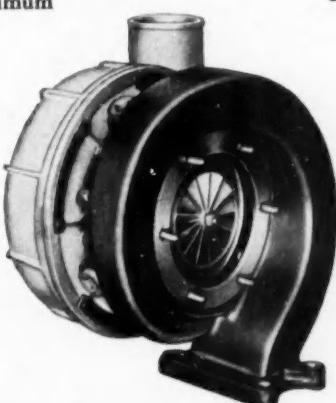
By

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MARINE TYPE  
MODEL D 55M TURBOCHARGER



AUTOMOTIVE TYPE  
MODEL D SU TURBOCHARGER

OTHER  
PRODUCTS

COOLING FANS  
AIR STARTING MOTORS  
SUPERCHARGERS  
(POSITIVE DISPLACEMENT)  
OIL PUMPS  
WATER PUMPS  
CRANKSHAFT  
VIBRATION DAMPERS  
AUTOMATIC  
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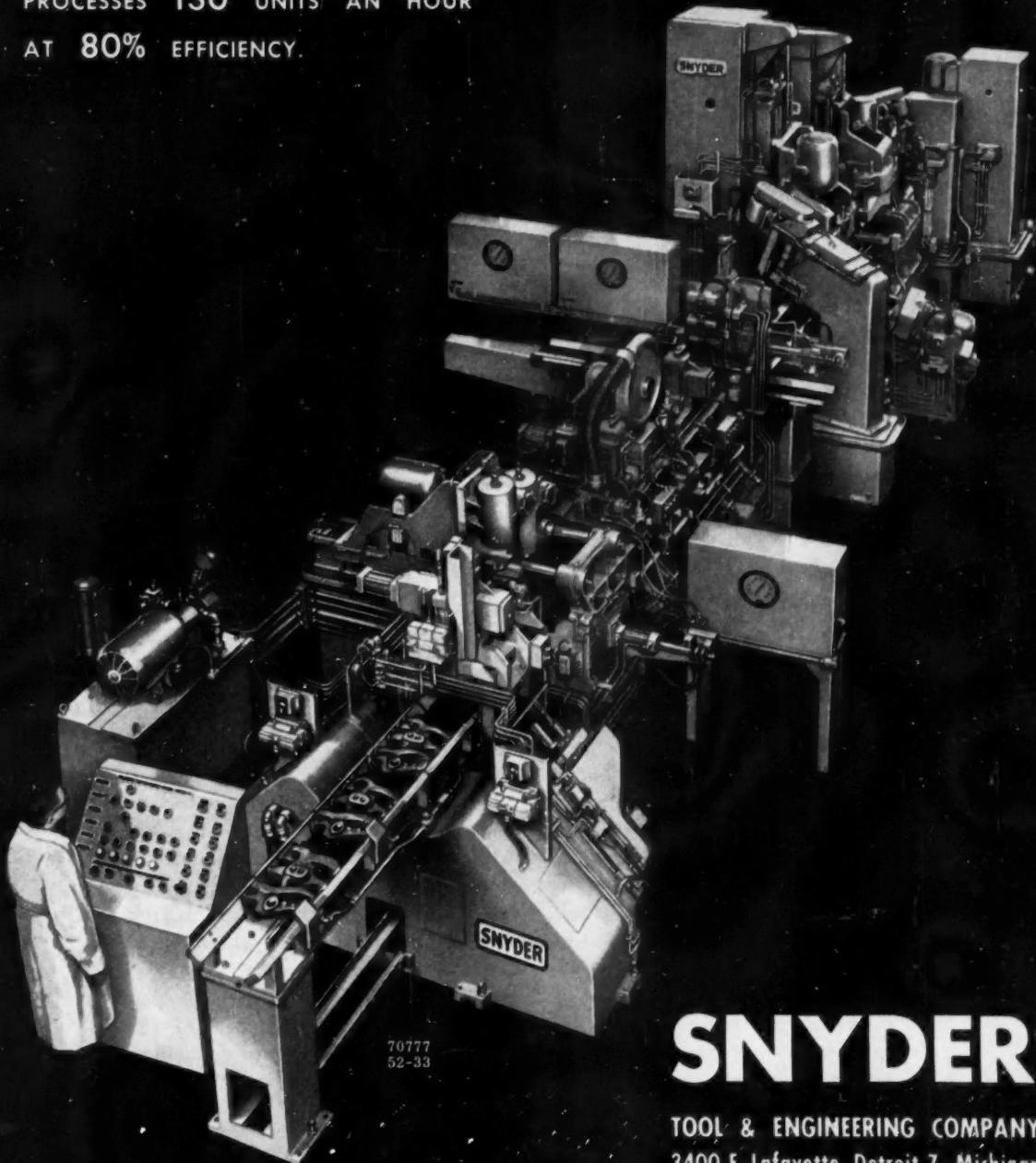


UNITED STATES STEEL

# SNYDER SPECIAL

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TRANSFER MILLS, DRILLS, CORE-DRILLS, REAMS AND TAPS INTAKE MANIFOLDS; TESTS MANIFOLD FOR AIR LEAKAGE AND VOLUMETRIC AIR FLOW, INSPECTS PROCESSING PROGRESSIVELY, MARKS REJECTS; INSERTS HEATER TUBES; PROCESSES 130 UNITS AN HOUR AT 80% EFFICIENCY.



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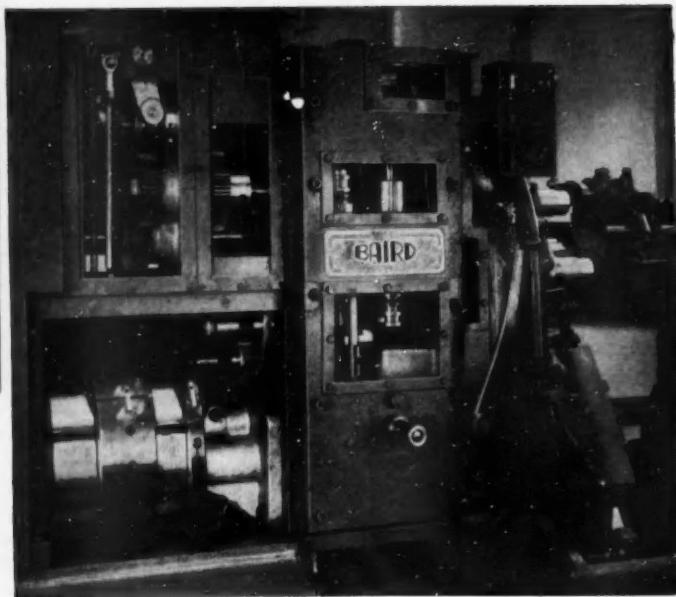
... IF IT'S A HIGH PRODUCTION PROBLEM . . .

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BAIRD

ABOUT IT



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And that, we believe, is typical of Baird's whole approach to high production machinery and tooling. For years, people have said "ASK BAIRD ABOUT IT" only because they know we will give them the right answer. Send in your inquiries, gentlemen — we're never too busy to help.

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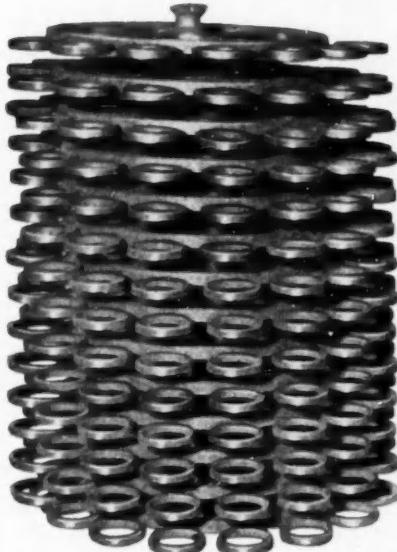
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# Solid Eatonite Valve Seat Inserts

**Heat Resistant**

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Individually Cast to Provide  
Dense, Non-Porous Structure.



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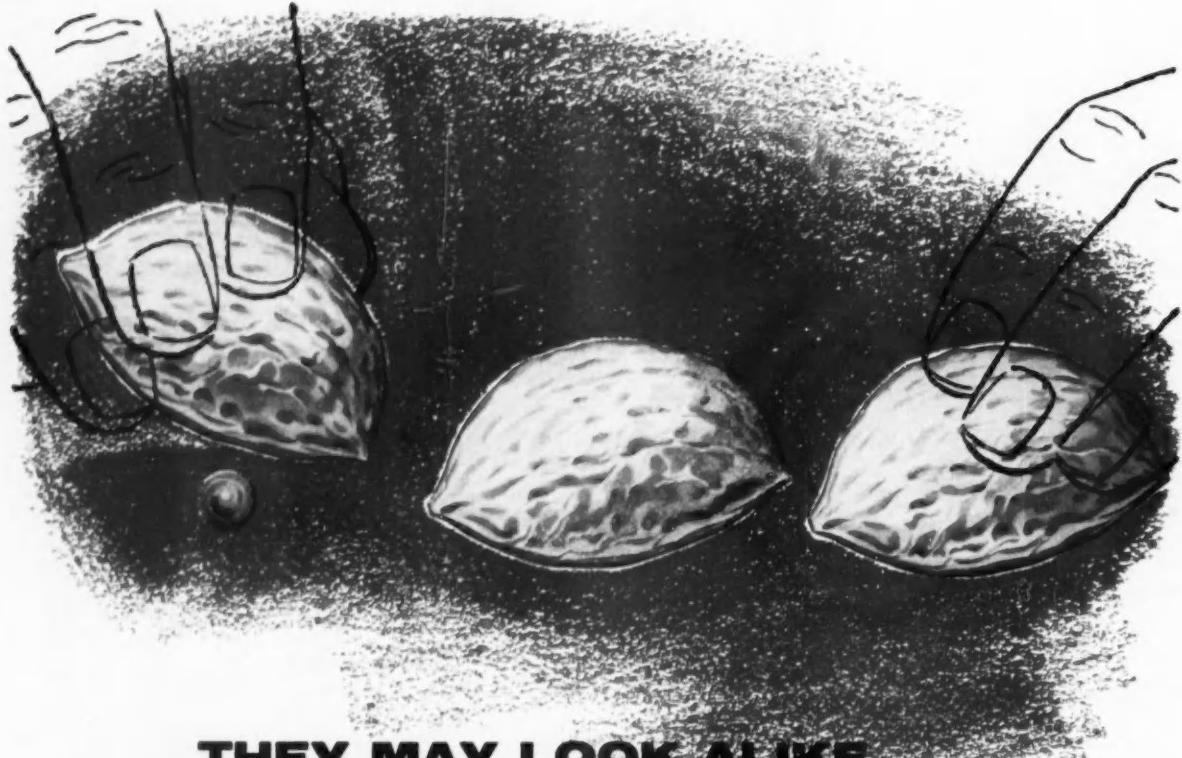
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# News of the MACHINERY INDUSTRIES

By Thomas Mac New

## Modernization Fosters Optimism in Machine Tool Industry

With many manufacturers laying the groundwork for a tough, competitive year ahead, machine tool builders are now certain they will close the books on 1954 in a fairly good position. Realizing that a rocky road faces them unless they modernize their equipment, small suppliers are revitalizing their plants to challenge their big competitors—many are buying new machine tools for the first time in years.

Modernization of production lines by bigger manufacturers, too, is giving the machine tool industry new encouragement, and it is hoping for a substantial upturn in business in the coming months. Machine tool builders also see more orders coming from the military with the approval recently of \$50 million for tools within the next six months, but this amount is just a drop in the bucket as far as the machine industry is concerned. The industry has been getting almost that much business in a single month from non-defense firms, and it is now going for the bigger civilian orders.

There have been some poor months for the machine tool industry this year, but the new influx of buyers evidenced the last few remaining weeks of this year sparks new optimism. In September alone orders for machine tools exceeded \$53 million, about 45 per cent over July, the lowest month this year. Although September's business was still under the 1953 average month, it is considered good.

## Monarch Ships 50,000th Lathe

Editors representing the principal magazines in the metalworking field gathered at Sidney, Ohio, for a press preview of product and research developments at The Monarch Machine Tool Co., as well as to view the crating of the 50,000th lathe produced by the company since its inception 45

years ago. The machine, a 10-in. EE sensitive precision toolmaker's lathe, was purchased by Sylvania Electric Products.

At the same time the company unveiled its latest product, an enormous metal turning lathe with 60-hp drive, said to provide for the fullest utilization of carbide tools on work pieces of large size. In the demonstration of this machine, an eight-in. diameter bar of SAE 4145 steel, having a hardness of 223 Brinell was turned at exceedingly high speeds and feed rates. In one test, using a  $\frac{3}{4}$ -in. depth of cut, the work was turned at 330 sfpm with feed rate of 0.035 ipr. This required 54 hp, removed metal at the rate of 100 cu in. per minute. Cutting was done smoothly, rapidly, without chatter or vibration.

The same bar, turned at 330 sfpm with  $\frac{1}{2}$ -in. depth of cut, was traversed at a feed rate of 0.043 in. per rev.

Editors also were shown the new Monarch machine tool center for the demonstration of the 15 latest models of Monarch lathes, including tracer attachments.

Revitalization of Many Producers' Plants to Meet Competition Has Resulted in Increased Business for Manufacturers of Machine Tools

## CEMA Elects Officers

Jervis C. Webb, president and general manager, Jervis B. Webb Co., Detroit, Mich., was elected president of the Conveyor Equipment Manufacturers Association at its 21st annual meeting held recently at White Sulphur Springs, W. Va. R. C. Solleberger was re-elected executive vice president and will be chief staff executive in the association's Washington, D. C., headquarters.

Other officers of the association are: vice president, Fred S. Wells, vice president, Stephens-Adamson Manufacturing Co., Aurora, Ill.; treasurer, E. E. Boberg, sales manager, Standard Conveyor Co., North St. Paul, Minn.; and secretary, R. B. Maas, president and general manager, Screw Conveyor Corp., Hammond, Ind.

Directors are: D. E. Davidson, vice president for sales, Link-Belt Co., Chicago, Ill.; J. H. Walker, president, Fairfield Engineering Co., Marion, Ohio; and Adrian W. Rich, president, Fairmont Machinery Co., Fairmont, W. Va. (Cont'd on next page)



Jerome A. Roterman, president, and Stanley A. Brandenburg, sales vice president, of Monarch Machine Tool Co. observe the 50,000th lathe produced by the 45 year old firm as it is being readied for shipment.

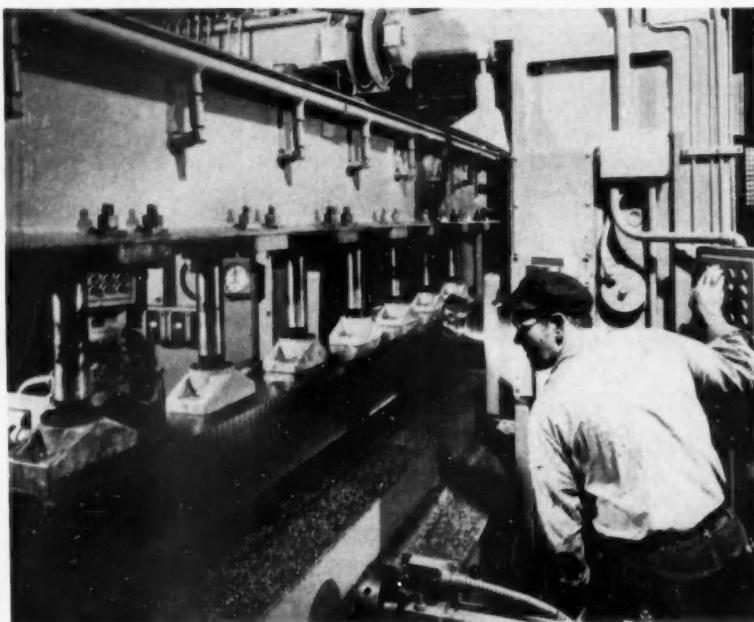
## J&L Adds Edge Mill

Latest addition to the cold-finishing department of Jones & Laughlin Steel Corp., Pittsburgh, is a duplex milling machine for the edge finishing of wide cold rolled flats. The machine finishes in stacks the edges of flats which are previously cold rolled at room temperatures on a 20-in., two-high, single-stand cold rolling mill.

Both edges of the flats are machined simultaneously. Flats to be processed range in size from 3/16-in. to 2 1/4 in. thick, from over six in. to 14 1/4 in. wide, and up to 12 ft long.

Using carbide-tipped mills 15 in. diam, the cutters operate at surface speeds of up to 450 fpm. Table speed during rough cuts on medium carbon steel is 32 ipm, and for the finishing cut, about 17 1/2 ipm.

The machine is equipped with a special hydraulic clamping fixture which holds the flats in place during milling. The fixture was designed by J&L engineers, who also designed the loading and unloading tables and the hydraulic work positioning devices which align the flats on the clamping fixture prior to machining the edges.



New duplex milling machine at the Pittsburgh Works of Jones & Laughlin Steel Corp., is shown face milling a stack of 32 1/4-in. thick cold rolled flat steel bars. The machine finishes both edges of the flats simultaneously, operating at a table speed of 32 ipm.

## Around the Industry

Late last month, Bullard Co., Bridgeport, Conn., broke ground for its new \$6 million foundry. This plant will provide heavy castings for the new line of Bullard machine tools.

Monarch Machine Tool Co., Sidney, Ohio, has announced that total shipments for nine months of 1954 are \$8.5 million below 1953 figures, but earnings after taxes are off only slightly more than \$300,000. The drop in orders is due to the defense

spending cutback and management feels as though current shipments and earnings represent normal operations.

Sundstrand Machine Tool Co., Rockford, Ill., is 42 per cent ahead of last year in respect to net earnings for nine months. The firm still has a \$45 million backlog — primarily for its constant-speed drives for aircraft. Two new plants were occupied by the expanding company within the past two weeks.

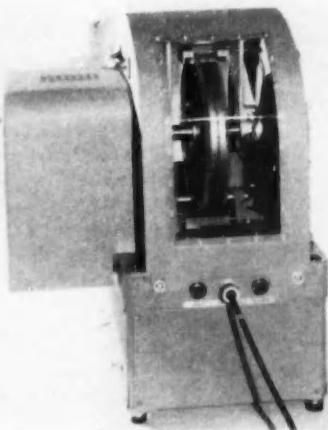
## Test Track Principles May Influence Highway Design

While many engineers have been envisioning highways of the future which would enable a driver to relax while the car is in motion, not too many details have ever been given about how this would be accomplished. It appears, however, that proving ground roads used by automobile companies to test their cars may have an influence on public highway design.

Phil Pretz, executive engineer of Ford Motor Co., indicated recently that adoption of proving ground principles to highway construction is feasible. Proving grounds, for example, are designed with what is

known as "pavement geometry." The principle is used in the banking of curves so that the test driver can negotiate the turns without having to touch the wheel.

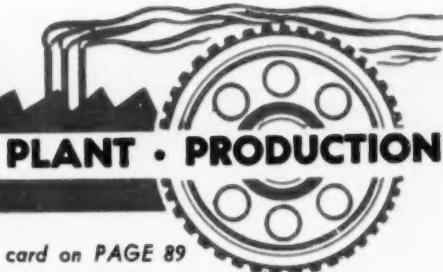
At its new proving ground in Romeo, Mich., Ford will use geometric formulas to arrive at angles of pavement slant that will balance off the centrifugal forces set up by the turning cars along every foot of the radius. Each test car would enter, seek a lane appropriate to its speed, traverse, and leave without the driver steering it.



### CORRECTION

This photograph shows the Pratt & Whitney (Div. of Niles-Bement-Pond Co.) proportional synchronizer as illustrated on page 67 of the AI Oct. 15 issue in the article, "Automatic Controls Take Over." The caption in that issue was inadvertently switched with the one used with the Haydon time delay relay photo on the same page. The P & W device will store a meter reading or other signal of varying magnitude, and reproduce the information at a later stage in the process. One example is in welding steel coil stock. The unit holds a thickness measurement taken on the coil ahead of the welding point, and later controls the welding current when that portion of the coil reaches the weld position.

# NEW EQUIPMENT



FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

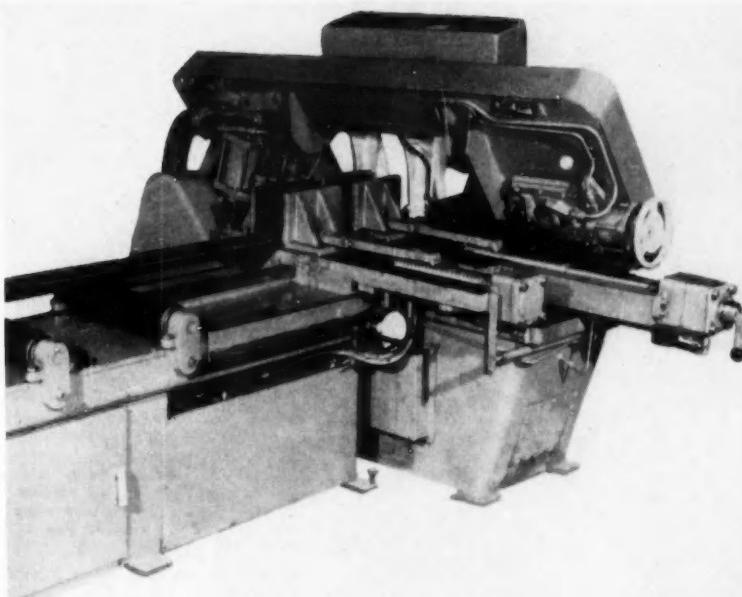
## Cut-Off Saw with Automatic Control

HIGH speed band sawing now is available for cut-off work, in a machine which is the firm's entry into this field. Features include automatic hydraulic controls on a single panel. A variety of models all feature the Demon high speed steel saw band.

Feed pressure is maintained hydraulically at a value set by the operator. The machine compensates for changes in work section, and the pressure can be read directly on a gage at the control panel. Blade speed is infinitely variable from 90 to 350 fpm and read on a tachometer. Band tensioning is automatically maintained hydraulically, being preset at the factory.

Other centralized controls include movement of the saw head and rate of coolant flow. A slide-rule type job selector lists feeds and speeds recommended for SAE steels and other materials.

An automatic index table is available to feed blanks up to 24 in. long and up to 12 in. in diameter or square. Accuracy is said to be  $\pm 1/64$  in. per blank and 0.002 in. per inch diameter on squareness. Maximum capacity with manual index is flat stock 12



Automatic power cut-off saw by Do-ALL uses high speed steel blade.

by 20 in. The Demon blade makes a  $1/16$ -in. cut.

Safety features include automatic stoppage in case of tool breakage, im-

proper band tensioning, or depletion of stock on automatics. *The Do-ALL Co.*

Circle 56 on postcard for more data

## 50-Ton Tester

DEVELOPMENT of a Sonntag universal fatigue testing machine of 100,000 lb capacity, the SF-100-U, is announced. Deliveries of this machine can be made within about 12 months.

The new machine will have a table six ft wide and nearly 12 ft long. Testing speed is 1500 cycles per minute and maximum movement of the vertically reciprocating, 14-in. by 14-in. platen is  $1/2$  in. Controls and contractors are in separate cabinets.

The principle of operation, production of a repeated constant load instead of a repeated constant deflection, is a feature as in all Sonntag

machines. Instead of one eccentric rotating mass, however, the dynamic load is produced by a mechanical oscillator comprising four eccentrically mounted masses driven through a synchronous motor and a speed reducer. The masses are geared together to work in pairs and are so set that the resultant horizontal components of their force output is zero. A feature of this arrangement is that the phase relationship of the resultant force of each pair can be changed while the machine is running so that the vertical force can be varied from zero to maximum. Tests can be started at zero load. The rating is maximum load in one direction, in-

cluding preload plus alternating load.

Inertia forces are balanced by heavy cantilever springs. Deflection of the preload springs is automatically controlled by an electronic circuit using a differential transformer to sense the position of the springs. This circuit is direction sensitive and will maintain a desired preload even though the specimen may creep, either in the tension or compression directions. Preload can be adjusted while the machine is running using an indicator reading in thousandths of an inch of spring deflection. *Baldwin-Lima-Hamilton Corp.*

Circle 57 on postcard for more data

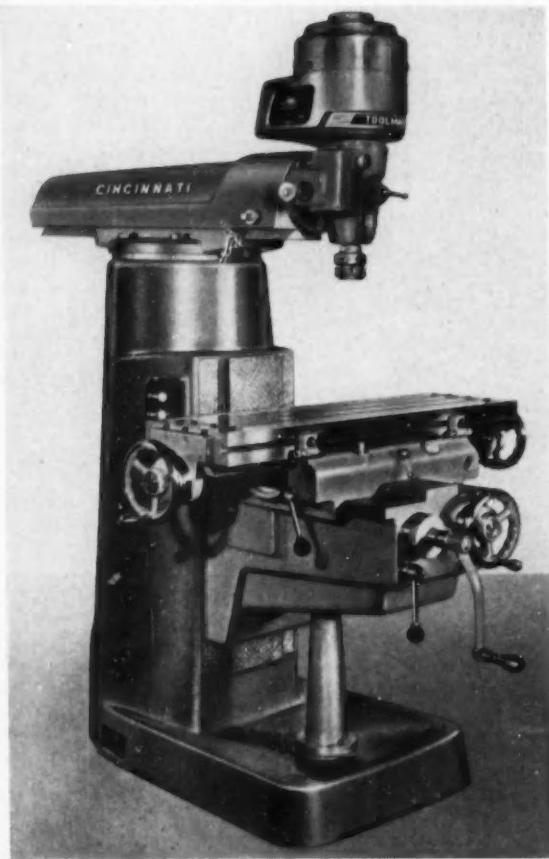
**NEW**

# EQUIPMENT

PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 89

## Improved Line of Milling Machines



For operating convenience on the Cincinnati Toolmasters, clamps for the table, saddle and knee are lever operated, can be repositioned as desired by the operator. Each end of the table is equipped with a table traverse handwheel. The spindle head can be swiveled right or left for taking cuts at any angle up to 90 deg.

TOOLMASTER milling machines recently were unveiled. They are available in three styles: 1A, manual feed to quill; 1B, power feed to quill; and 1C, heavy duty head. Standard ranges are 16-in. longitudinal, 10-in. across and 17-in. vertical.

The overarm is mounted in dovetail ways in the turret unit. This construction permits the operator to swivel and position the overarm for complete coverage of the table with the spindle head. Square gibbed saddle-knee bearing, patterned after larger machines in the line, is a prominent factor in ruggedness of the Toolmaster. The knee has a solid top

and an ample recess in front of the column face where chips can fall to the base of the machine.

The knee bearing on the column takes its bearing in the two V surfaces formed between the dovetail guide and column face. This construction is said to offer several times more resistance to deflection than the dovetail guide alone. The saddle is more than half the table length.

An anti-backlash device on the table feed screw consists of a double nut arrangement, one threaded to the other. Two screws may readily be loosened for backlash adjustment.

Motors for styles 1A and 1B are

the pancake type, integral with the spindle head. There are eight spindle speeds, selected by changing one or two belts. A choice of three ranges for 1A and 1B machines is: 108 to 2825, 140 to 3800 or 215 to 5650 rpm. Machines having the low range are powered by a  $\frac{3}{4}$ -hp motor, while machines within the medium and high ranges are powered by one-hp motors.

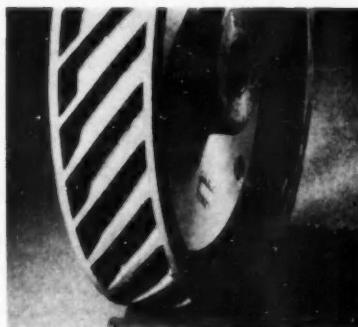
Nos. 1A and 1B machines are equipped with a built-in micrometer quill stop for depth adjustment when feeding the quill down. A lever operated quill clamp is located at the front of the spindle head. Angular positioning of the spindle head is accomplished through a worm and wheel arrangement having a crank extension at the side of the overarm.

No. 1B machines are identical to No. 1A except for the addition of power feed to the quill. Feeds are 0.002 or .006 in. per revolution of the spindle. No. 1C machines are equipped with a motor driven overarm unit. A can-type two-hp motor, mounted in the rear end of the overarm, drives the spindle through a gear train. Eight spindle speeds are available. Like the Nos. 1A and 1B machines, the spindle head can be swiveled to the right and left. An intermediate unit may be added to provide swivel adjustment at right angle to the table T-slots. Cincinnati Milling Machine Co.

Circle 58 on postcard for more data

## Rubber Polish Wheel

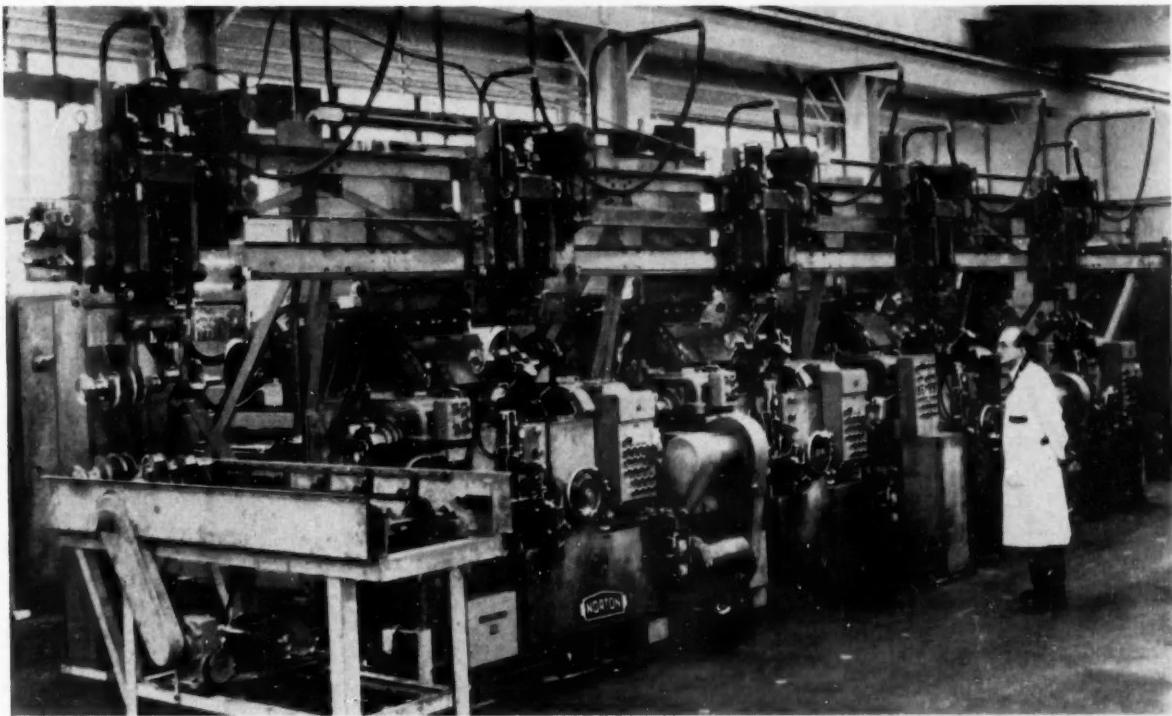
The TF-54 contact wheel with softness and conformability has been developed for coated abrasive belt polishing, jointly with



Minnesota Mining and Manufacturing Co. It is made of a new red rubber compound—abrasive and oil resistant—offering a high-tensile 20 durometer wheel which can safely be run at speeds up to 10,000 fpm. In addition, it is dynamically balanced, has a demountable rim or tire, is serrated with  $\frac{1}{4}$  in. lands and  $\frac{3}{4}$  in. grooves and has rubber side flanges which prevent edge wear. (Chicago Rubber Co.)

Circle 59 on postcard for more data

## Crankpin Grinding is Fully Automatic



The Norton TTCG automatic crankshaft pin grinder controls diameter to a tolerance of within  $\pm 0.0002$  in. Loaded transfer heads are shown in the raised position, ready to carry the workpieces to the right.

FULLY automatic crankpin grinding will soon become a reality with the installation of the initial machine at Studebaker-Packard's Utica, Mich., engine plant. The automated setup for V-8 crankshafts includes automatic work handling through four grinding stations, one for each pin. Production rate is 45 to 60 pieces per hour at 100 per cent efficiency.

Crankshafts are brought to the machine on a conveyor at the left end. One of five transfer heads reaches down to pick up the first workpiece, carry it horizontally to the right, and lower it into the first station. At the same time other transfer heads have handled four other crankshafts, advancing the last one to the exit conveyor on the right.

In addition to the loading hooks on each transfer head, there is a rough locating hook to position the work for the particular pin to be ground. After the work is lowered and released, a rotating cam locates it lengthwise in front of the grinding wheel. An arm adjusts angularity and a pin engages a hole in the crankshaft flange.

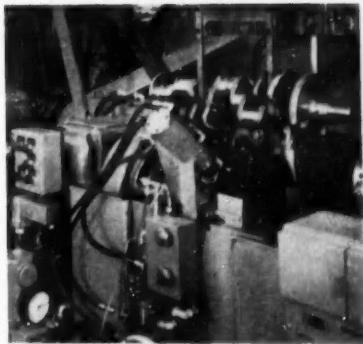
The automatic cycle includes operation of the steady rest, and the grinding operations are fully automatic. The work diameter is sensed by a Sheffield Lectrolair air gage which measures the chord of an arc of the pin surface. Wheel infeed is controlled automatically by this measurement. Wheel truing of the face and radius is done automatically at every work cycle or after a preset number of cycles. Infeed and drive motor speed both are automatically compensated for the change in wheel diameter.

The machine is built on two bases, each with two wheel slides. Cabinets for electrical controls are located behind the machine. Four 25-hp d-c motors, with motor-generator sets and power packs for controlling speed, operate the 42-in. grinding wheels. The four work heads are powered by two 5-hp motors. Additional motors drive the hydraulic equipment and provide a-c dynamic braking for the transfer system.

Grinding wheel life is expected to be greatly increased over conventional machines. This is attributed to the

controlled truing, and to the rigid cartridge type bearings which support the wheel spindle at both ends.

Controls are all built to JIC standards, and are located for ease of



Closeup of a crankshaft on loading hooks, just above a work station. Gaging head and control can be seen.

maintenance and trouble shooting when necessary. Lubrication is automatic through a built-in system feeding oil to the wheel slides, ways, and other moving parts. Norton Co.

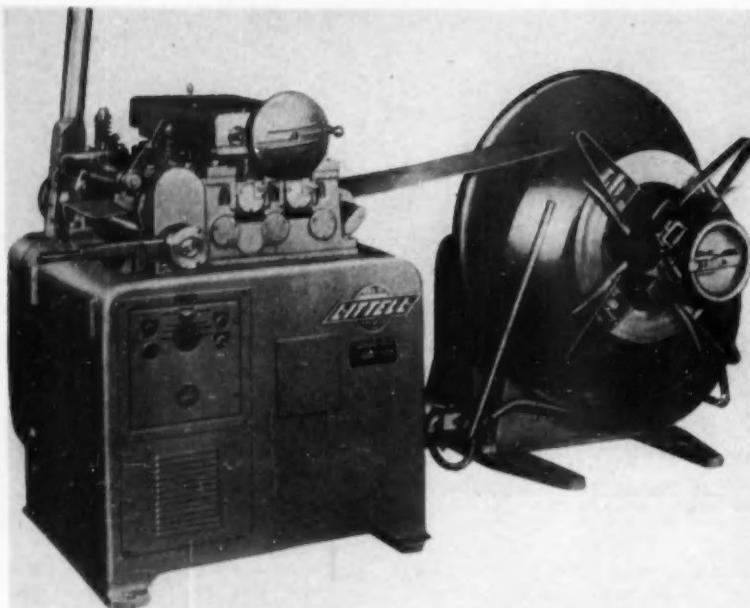
Circle 60 on postcard for more data

# NEW EQUIPMENT



For additional information, please use postage-free reply card on page 89

## Feed Automates a Punch Press



This feeding and straightening machine will convert a manually operated punch press to automatic operation.

**H**YDRAULICALLY driven, the No. 4 HRP rack and pinion feeding and straightening machine is available. It handles stock up to  $\frac{1}{2}$  in. thick.

The self-contained unit is driven through a van type pump. The rack actuates an overrunning clutch geared to the pinch rolls, which in turn drive the lower straightening rolls to allow maximum thickness of stock.

The electric controls advance the

stock through a full rotation of the crank operating the rack. Half the turn feeds stock to the press, and the other half returns the rack to feeding position. Before the end of the cycle, a cam trips the press. Standard speed is 40 strokes per minute. Feed range is adjustable up to 19 in., or to 38 in. by double cycling at half speed. It is primarily for one-station die work.

F. J. Littell Machine Co.

Circle 61 on postcard for more data

## Continuous Foil Gage

**T**HE X-Ray Thickness Gage is designed to continuously gage aluminum foil as thin as 0.0003 in. and steel foil as thick as 0.075 in. with accuracies of one per cent. This non-contacting mill gage utilizes a split beam, directing part through a wedge-shaped disk having a variation in thickness equal to the range of the

gage. The remainder of the beam penetrates the foil. As the foil strip progresses, a difference in thickness between the wedge and the gaged material will cause the electrical balance system to equalize the beam strength by tilting the wedge. This angular change is read directly as deviation in thickness. Pratt & Whitney Div., Niles-Bement-Pond Co.

Circle 62 on postcard for more data

## Line of Four-Way Valves

**P**ILOT operated, solenoid controlled four-way valves designed to provide all porting and positioning arrangements in circuits up to 3000 psi has been introduced.

Pilot pressure can be external or internal and change-over is made by simply rotating the solenoid valve 180 deg. A choice of spool types and spool positioning is provided. Adjustable pilot chokes for smooth spool reversal are being offered as an option.

These valves are designed to be interchangeable with all comparable valves now in use. Denison Engineering Co.

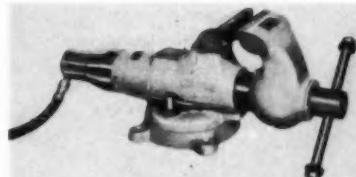
Circle 63 on postcard for more data



Capacities are 20 gpm and  $1\frac{1}{4}$  gpm for the  $\frac{3}{4}$  in. pilot and  $\frac{1}{8}$  in. solenoid valves respectively. These two series are available singly also.

## Air-Hydraulic Vise

**A**N air-controlled hydraulic vise, called the WiltOmatic, is designed to leave both hands free for work. Compressed air, controlled by a foot pedal, is used to activate the vise. An air-hydraulic booster cylinder converts and multiplies air pres-



WiltOmatic air-hydraulic vise can be adjusted to handle different work pieces.

sure, producing a powerful, vibration-proof grip.

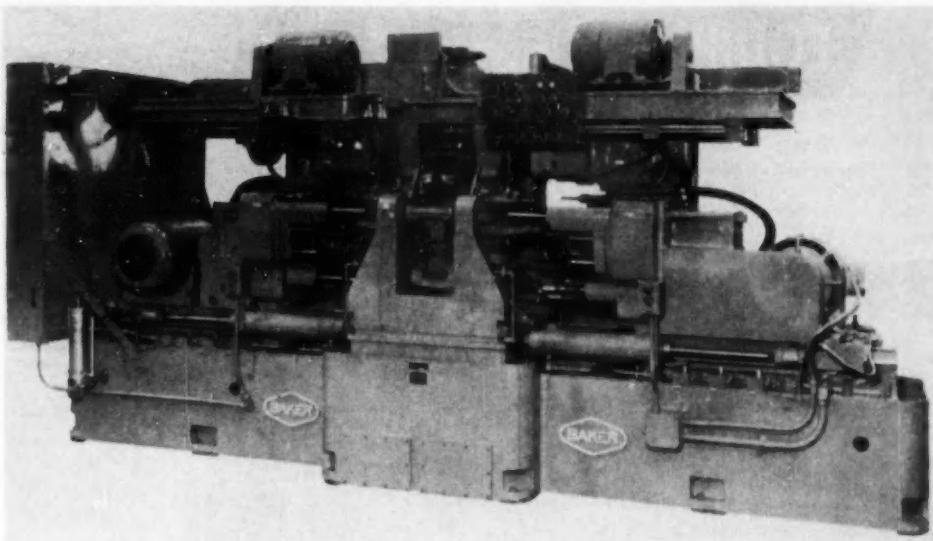
The vise is designed for production runs of parts that require manual finishing operations. It can also be used as a manual vise, if desired. Wilton Tool Mfg. Co.

Circle 64 on postcard for more data

## Two Ball Joint Suspension Parts Machined Automatically

This hydraulic feed machine performs end operations automatically on integral parts for ball joint suspension. The machine hollow mills, drills and taps on both ends simultaneously. Using high speed tools, it produces 250 parts per hour loading two parts. (Baker Brothers, Inc.)

Circle 65 on postcard for more data



### Model 75 Horizontal Drill

In a redesigned line of table type horizontal boring, milling and drilling machines, the paramount feature is the pendant control. Functional controls of the machine oper-

small drilling and tapping operations.

The weight and proportions of the new head post and head are considerably greater than on the previous model. An optical measuring device

three, four and five in. diameter spindles with a wide range of head post heights, bed lengths, and table sizes. *The Bullard Co.*

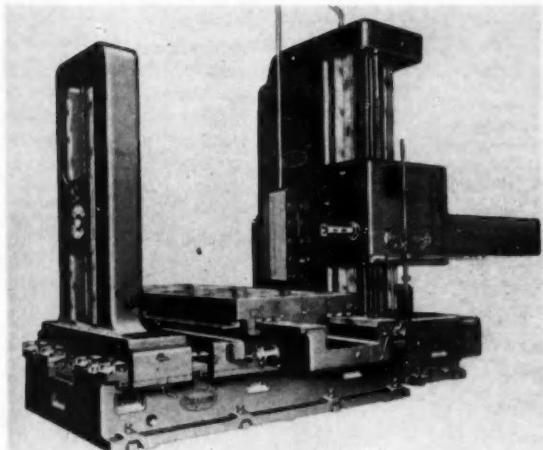
Circle 66 on postcard for more data

### Screw-Lock Insert

THE locking fastener designated as the screw-lock insert was developed as a companion to the standard wire thread insert. Both are made of precision-formed stainless steel wire having an ultimate tensile strength of about 200,000 psi.

Three functions claimed for the insert are: It automatically locks the screw so that it is vibration-proof; it provides a high-strength thread in materials of all kinds; and it automatically locks itself into the parent material. *Heli-Coil Corp.*

Circle 67 on postcard for more data



The Bullard Model 75 horizontal machine showing the pendant control and massive proportions.

ated from this movable pendant station include: directional feed and traverse control of the spindle, head, table and saddle; selection of feed and speed rates; spindle direction of rotation; and head binders. The operator actuates directional levers for any required feed and traverse motion.

Both a screw and a rack feed for the spindle provides a smooth, steady power feed for boring as well as a very sensitive hand feed action for

is provided for the head and table.

Other standard features include feeds in inches per revolution and inches per minute for all motions, automatic depth knockout for spindle, hydraulic counterbalance for head and massive rear post for supporting extension boring bars. Accessories include continuous feed facing heads, right angle milling attachments, thread cutting attachment, coolant system and boring bars of all types.

These machines are available with

### Propelled Tool Box



Shopmobile self-propelled workshop is steered by walking operator. Welded steel truck has cabinets, work bench, automatic parking brake. Unit is 39 in. wide. (Stahl Metal Products, Inc.)

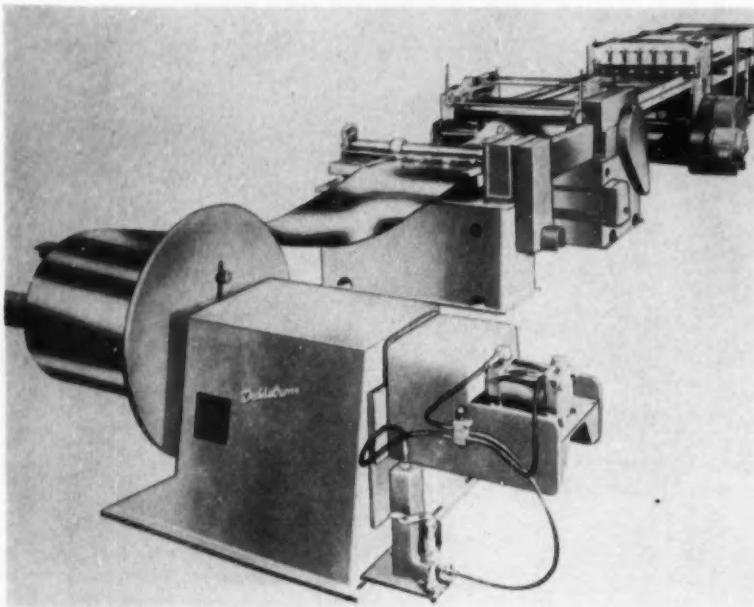
Circle 68 on postcard for more data

# NEW EQUIPMENT



For additional information, please use postage-free reply card on page 89

## Shear Line for Coil Stock



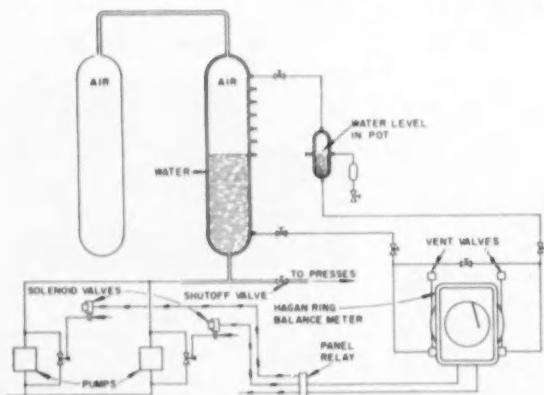
A shear line consists of hydraulic expandable mandrel coil reel, roll straightener with all rolls power driven, hump table, high speed shear, conveyor type measuring and take-off unit. Operations include decoiling, flattening, shearing, edge trimming and measuring length. Steel or aluminum of 12 gage and lighter can be handled up to 72 in. wide. Length tolerance is 1/32 in. Speed range is 50 to 150 fpm. (Dahlstrom Machine Works Inc.)

Circle 69 on postcard for more data

## Control for Press Bottles

**W**ATER level in high pressure bottle accumulator systems can be measured directly with a balance

meter now available. These bottles are used to supply storage for pumps that operate high pressure hydraulic



Schematic of the Hagan water level measuring and control system for tall columns.

presses of 200 psi and upwards.

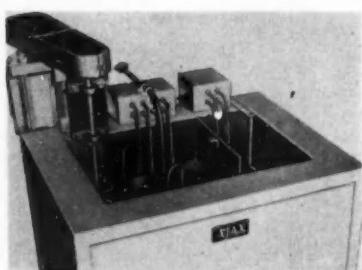
In this system, the accumulator bottle employed is the air loaded type rather than the individually loaded piston type. The ring balance meter measures the water level directly rather than using air pressure method. Changes in the water level cause rotation of the ring which in turn closes or opens mercury switches in a sequential operation, making possible automatic control of the pumps. Each pump is started by a decrease in water bottle level, actuating the mercury switch at a predetermined point. The pump is stopped as the level increases to the second predetermined point. Switches are staggered to actuate the proper number of pumps to meet the load demand. The gage used is suitable for direct calibration of a 300-in. water column. *Hagan Corp.*

Circle 70 on postcard for more data

## Isothermal Salt Furnace

**D**EVELOPMENT of a cataract salt bath isothermal quenching furnace is said to provide the quenching power of molten salt (400 F and above) equal to that of agitated oil (100 F to 150 F).

It is now possible to heat treat by the isothermal quenching process, steel products that were heretofore considered borderline cases — those that could not be austempered or martempered. Cataract quenching increases the cooling rate in the critical range 1300 F-1000F thus getting past



Salt bath furnace of high quenching power.

the nose of the "S" curve. Thus, any steel that can be satisfactorily hardened by oil quenching can now be either martempered or austempered in a cataract quench furnace.

The secret to the quenching power of this furnace is said to be the uniform, high velocity downward flow of salt confined within a special quench header. *Ajax Electric Co.*

Circle 71 on postcard for more data

## Materials and Processes: Plastics, Alloys, Cleaners, Plating

### Preassembled Plastic Sheet

Formable glass-reinforced plastic sheeting ready for use in mass production was announced recently. Known as Scotchply brand reinforce plastic, it is a glass-in-plastic laminate that is designed to overcome variability in properties, and the need for hand lay-up in production. It comes ready for molding by the matched metal, plastic die or bag process, or for drawing operations.

The plastic consists of one or more uncured (unhardened) moldable sheets of plastic, each of which is integrally reinforced with uniformly dispersed, aligned continuous glass filaments. Each sheet is composed of 60 per cent glass and 40 per cent plastic resin by weight. The sheets are available with filaments in successive layers aligned or at angles. *Minnesota Mining and Mfg. Co.*

Circle 72 on postcard for more data

### Glass-Silicone

A glass-filled silicone compound, No. 301, has been developed for molding high temperature plastic parts which may be pulled hot without cooling the mold. Afterbaking is unnecessary except where parts are to carry a load at high temperatures. Properly molded parts will withstand continuous exposure to 450 F, plus intermittent exposure to as high as 700 F.

Typical properties after molding 10 min at 340 F include a tensile strength of 5000 to 7000 psi, a compressive strength of 10,000 to 12,000 psi, and an impact strength of 15 to 22 ft-lb per inch. Flexural strength ranges from 12,000 to 14,000 psi at room temperature and 5000 psi at 392 F. *Dow Corning Corp.*

Circle 73 on postcard for more data

### Hard-Facing Alloy

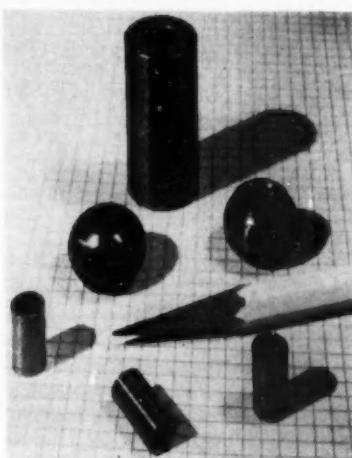
Chrome-cobalt-tungsten hard-facing alloy for general hard-facing applications, called Walloy No. 6, is available as hard-facing rod for oxy-acetylene torch application. The major advantage in the hot-work applications is claimed to be the ability to hold a good cutting edge. The firm says it provides high impact, corrosion and abrasion resistance. It resists oxidation, does not readily heat-check under pressure at elevated temperatures, and is virtually unaffected either by most common corrosive chemicals or by atmospheric corrosion. It also re-

sists chipping and spalling and has some ductility, retaining these qualities at red heat. Deposits of the new material can be machine ground to a high finish. As deposited by an oxy-acetylene torch, Walloy No. 6 has an Rc hardness of 40-44. Tensile strength is 105,000 psi, specific gravity is 8.3, and melting point is 2325 F. *Wall Colmonoy Corp.*

Circle 74 on postcard for more data

### Bearing Material

A bearing material which operates at temperatures of minus 120 F to plus 500 F can be used with or without



oil. The material is said to have exceptional wear characteristics at extreme temperatures and also provides a superior bearing when used in conjunction with oil. In oil applications, the solid lubricant of moly, graphite, etc., has oil retention and absorption values which provide a wicking action to supply the bearing surfaces with a perfect lubricative film.

The material contains over 40 per cent lubricative solids; has an ultimate compression strength of 22,700 psi. *Booker-Cooper, Inc.*

Circle 75 on postcard for more data

### Brush Electroplating

Developed primarily for re-touch and repair work on plated equipment and parts, the brush method of electroplating is being more widely promoted as an original permanent electroplating process. It is reported to give a thin nonporous coating with a strong bond.

The base metal upon which plating

has been applied, can be heated to 1500 F. and instantly quenched in cold water or oil without damage to the bond or deposits. The firm offers complete industrial equipment with brushes, plating solutions and anodes for plating brass, bronze, cadmium, cyanide copper, sulphate copper, gold (24 Carat), lead, nickel (plus cobalt), nickel (black), silver, tin and zinc. *Ajax-Consolidated Co.*

Circle 76 on postcard for more data

### Plastic Release Agent

A formulation for releasing epoxy resins from plaster, wood, Toolplastik and metallic molds is called PreEpoxy Partingkote 832-A. It is said to be correct for any room-temperature curing epoxy. It is a film-forming, low-shrink plastic solution with a black color which minimizes the possibility of misses or thin areas in the applied parting film. It is a ready-to-use material which may be sprayed or brushed onto the mold. *Rezolin, Inc.*

Circle 77 on postcard for more data

### Cold Degreaser

Large-scale production of a non-flammable solvent for use in the metal and metal working industries has been announced. The product is Chlorothene (Inhibited 1,1,1-Trichloroethane). According to the maker, it fulfills the industrial need for a low-toxicity, non-flammable solvent to be used in cold cleaning and cold degreasing operations. *Dow Chemical Co.*

Circle 78 on postcard for more data

### Aluminum Alloy

Availability of aluminum alloy 5357 (K157) for applications requiring an anodized finish similar to polished chrome plate and stainless steel is announced. Alloy 5357 lends itself favorably to all mechanical, chemical and electrochemical finishing procedures. After anodizing, it has particularly high reflectivity characteristics superior to the anodic coating obtained in 3003 (3S) and 5005 (K155). This high specular finish is also maintained in color anodizing.

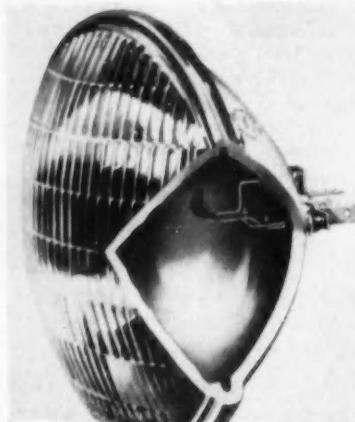
Forming characteristics are similar to those of 3003 although 5357 has slightly less elongation in the softer tempers. Composition is 0.30 per cent manganese and one per cent magnesium. *Kaiser Aluminum & Chemical Corp.*

Circle 79 on postcard for more data

# NEW PRODUCTS.

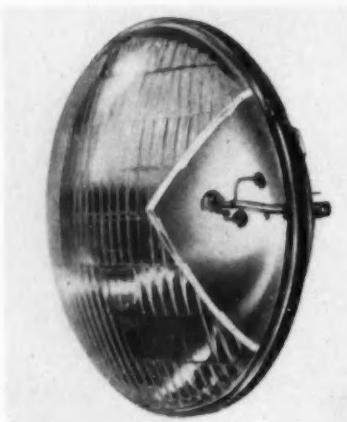
FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

## Revised Sealed Beam Headlamps Revealed by Three Makers



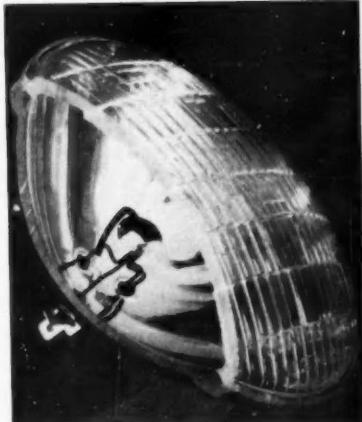
Now in production, All-Weather headlamps will be available to motorists for replacement on existing cars in 39 states, beginning in December. Improved lamps will be standard equipment on new cars after the other nine states have made necessary law changes. All state approvals are expected to have been made by mid-1955. The high beam gives 25 per cent more light and the beam pattern remains virtually unchanged. The low beam, or passing beam, produces about 23 per cent more light and directs twice as much light down the right side of the road. *General Electric Co.*

Circle 36 on postcard for more data



Immediate production of Vision-Aid, a new sealed beam automobile headlamp was announced recently. To meet the anticipated demand, a 50 per cent expansion of manufacturing facilities has been completed at Boyertown, Pa., where the firm's entire production is devoted to sealed beam lamps. Improved seeing distance in relation to stopping distance, especially in bad weather, is the major achievement of refinements in lens, reflectors and filaments, and increased wattage, the company reported. It is producing the headlamps in six-v and 12-v types for replacement purposes. *Tung-Sol Electric, Inc.*

Circle 37 on postcard for more data

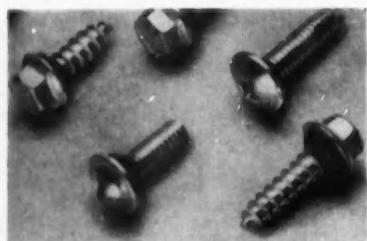


Called the Safe-T-Beam lamp, the new sealed beam unit above makes possible better see-ability in bad weather. Increased wattage, and a new lens and reflector design provides more light down the road and on the right shoulder of the road. It is completely interchangeable with present sealed beam lamps. The new lamp features a "fog cap" or filament shield that eliminates the stray upward light that would ordinarily be reflected back into the driver's eyes from the moisture particles of fog, rain and snow. The lamp is available in both six and 12-v ratings. *Westinghouse Lamp Div.*

Circle 38 on postcard for more data

## Rubber Seal Part of Fasteners

Development of a multi-purpose fastener with a one-piece metal



washer-head and assembled neoprene washer has been revealed. It is for use in preventing leaks, for protecting surfaces, absorbing shock and stopping squeaks. Called Tuff-Tite, the fastener is seated and an undercut in the washer head traps and controls the flow of the neoprene at the outside edge. The washers will flow in any direction to conform with uneven contours of the surface. *Townsend Co.*

Circle 39 on postcard for more data

## Reusable Lock Nut

A one-piece, free spinning, reusable nut, which locks itself when seated, is currently being manufactured. The upper portion of the nut is slotted and the bottom face is undercut. When the nut is tightened the threaded upper segments move inward causing the nut to produce a vibration-proof lock on the threads of the screw. The new lock nuts are made in all machine screw sizes in steel, brass or aluminum. *Jacobson Nut Mfg. Corp.*

Circle 40 on postcard for more data

# Free INFORMATION SERVICE

**Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.**

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## FREE LITERATURE

### Ultrasonics 1

Removing contamination from precision parts was solved for its own production, and the firm now offers the equipment. Eight-page folder plus data sheets give complete story with case histories. *Pioneer-Central Div., Bendix Aviation Corp.*

### Automation Fixtures 2

Examples of fixtures the firm builds for transfer machines, rotary and trunnion index machines, and tooling for standard machines are illustrated in an eight-page folder by *Swartz Tool Products*.

### Honing Facts 3

Fourteen setups for single and multiple-spindle honing are pictured in Vol. 6, No. 3 issue of *Cross-Hatch, Micromatic Hone Corp.*

### Stepping Relays 4

A 12-page booklet P-84 contains illustrations and technical chart data featuring 12 new stepper relays including midget, high speed, vibration resistant and interlock types for add-subtract, continuous rotation, electrical reset and other applications. *Guardian Electric Mfg. Co.*

### Motor Drive Selection 5

"Tools of Automation," a 12-page booklet, expresses the company's philosophy for automation of single machines or continuous processes. Booklet divisions illustrate the selection of motors, Adjustable-Speed V\*S Drives, and electronic controls and regulators. *Reliance Electric and Engineering Co.*

### Time Delay Relay 6

A time delay relay with a double-throw auxiliary switch which will allow push-button operation, or instant or delayed contacts after deenergization, is described in Bulletin SR-6, available from the AGA Div., *Elastic Stop Nut Corp. of America*.

### Repeat Timer 7

A folder describes the Duo-Set timer for controlling on-off cycling of two independently-adjust load circuits in machine and process control. *Automatic Temperature Control Co.*

### Switches 8

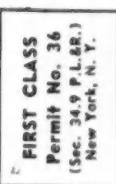
A full range of switches for industry is described in catalog 84-97. *Micro-Switch Div., Minneapolis-Honeywell Regulator Co.*

(Please turn page)

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**Welders**

All phases of the new standard commercial SP 2 and EP 2 Series air operated, press type, low impedance, single phase, spot and projection welders are covered in bulletin 317-2. Also included is the ESP 2 combination projection-spot welder. *Sciaky Bros., Inc.*

**9 Drill Bushings**

A catalog, fourth edition, of Anchor bushings for sheet metal and laminate plastic drilling is now ready. Includes data on making drill templates with latest style bushings. *Hi-Shear Rivet Tool Co.*

16

**Monorail Tractor**

A tractor unit is now available to move monorail hoists along the rail. Data sheet 833. *Detroit Hoist & Machine Co.*

17

**Large Sprockets**

Design and manufacturing details of Cogmatic sprockets for tractors are portrayed in a booklet recently published. *Andwell Mfg. Co.*

18

**Oven Control**

A proportional position control for fuel fired ovens or baths, the Capacitrol 405 is self-contained. Data sheet C-6493. *Wheelco Div., Barber-Colman Co.*

19

**Balance Machine**

Features of Hi-Eff universal static balancing machines are described in a four-page folder. *Taylor Dynamometer & Machine Co.*

20

**High Speed Threader**

A thread rolling machine which uses planetary dies to thread up to 2000 blanks per minute is described in circular No. 942-A. *Waterbury Farrel Foundry & Machine Co.*

21

**Aluminum Extrusions**

"Drafting Standards — Aluminum Extruded and Tubular Products," second edition, has been issued. Copies may be obtained by writing on company letterhead to *The Aluminum Association, 420 Lexington Ave., New York 17, N. Y.*

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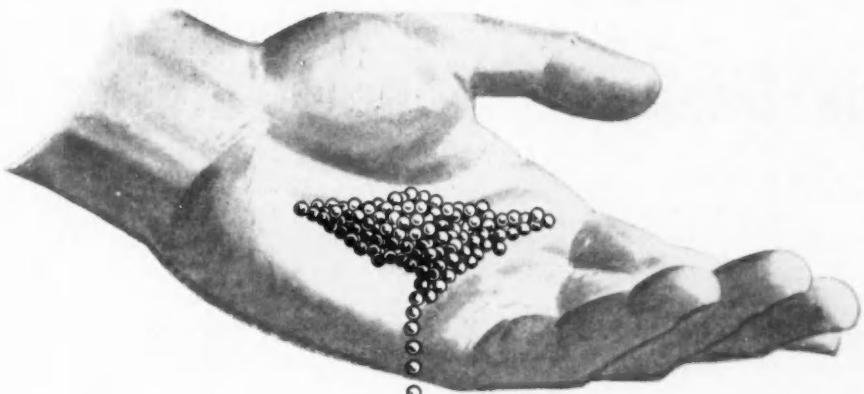
**Coolant Filter**

Sixteen-page bulletin, 350-C, illustrates and describes the new Kleenall combination magnetic and fabric filter. *Barnes Drill Co.*

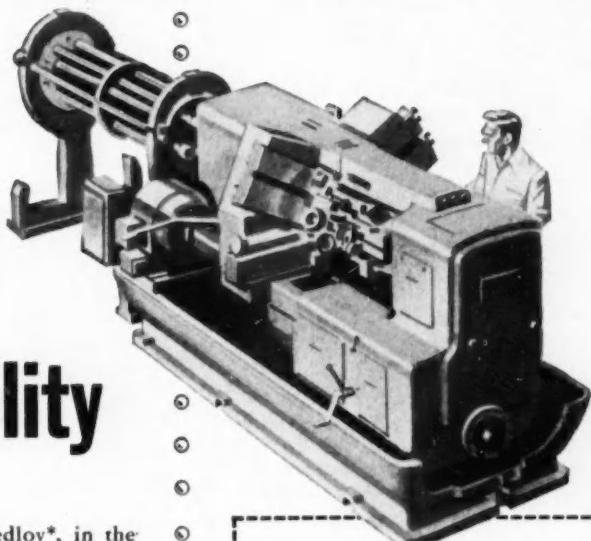
15

**Mill Aluminum**

Aluminum rod, bar and wire data and applications are presented in a new 160-page book. Write on company letterhead to *Kaiser Aluminum & Chemical Sales, Inc., 22 N. LaSalle St., Chicago 1, Ill.*



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# Engine Designers Concentrate on Torque

By Joseph Geschelin

## More Power

The big engine race developed into a Derby this year with V-8's practically sweeping the industry from top to bottom.

Studebaker was the first to announce, with Pontiac and Chevrolet coming in at the end of October. As it happened, Chevrolet was the first of the Big Three to expose its hand as to horsepower rating, more or less setting the pattern for ratings in the low-priced field. The others played it close to their vests until the very last minute.

This is in the nature of an interim report to our readers since the complete story cannot be organized until all returns are in during January.

Obviously, engines have touched higher ratings this year than anyone had anticipated in the face of comments made about earlier models. With a floor of around 160 bhp for the low-priced cars, each group was necessarily upgraded and when the returns are all in, the top bracket may well be reaching for 300 hp.

## Torque or Hp

Despite the scramble for power—something, incidentally, that is bothering engineers no end—there has finally emerged an important and clear-cut pattern of objectives. From now on the big story is TORQUE rather than horsepower. Large displacement is being deliberately stressed because the story will be built about high torque ability at the low end where starting acceleration is required; also because torque is the principal factor in providing safe passing ability on the highway.

With this emphasis upon torque, most engineers admit that the most practical way to get it in an existing engine is by increasing displacement. And the specifications of numerous engines will show that displacement was increased this year for that reason. This marks a radical change in philosophy. It will be recalled that when some of the present day V-8's began to come in a few years ago, the story was that the basic engine would remain the same despite progressive increases in output. And this is still true basically, if horsepower increases alone were the criterion. However, increase in engine output was sometimes accompanied by some depreciation in performance at the low end.

## Performance Counts

The general conclusion is that large horsepower alone has become meaningless. It is recognized today

that what counts is low end performance. And that's strictly a function of high torque in the right range. The only thing that counts is how much effort is being applied between the rear wheels and the road.

As a matter of fact, both Oldsmobile and Lincoln broke with tradition last year by increasing engine displacement.

One problem remains unsolved. Torque and horsepower are tied together intimately since torque constitutes one of the basic parts of the power equation. Consequently, every increase in torque needs must increase output. So we are in the midst of a vicious circle that cannot be broken until someone decides that a limit has been reached.

## Design Pattern

Constructional design too has the appearance of a generalized pattern. Here are some basic similarities: 90-deg V-banks; five bearing crankshafts; overhead valves; torsionally rigid structures; high compression ratio; large valves; hydraulic valve lifters; aluminum pistons with three rings, many engines using the new steel rail compression ring.

Yet there is ample room for important differences in design, depending upon the ingenuity of the designer. For example, although practically every new V-8 has a valve train with a single rocker arm shaft, some of Chrysler Corporation's passenger car engines have two rocker arm shafts. This permits an arrangement of laterally-spaced valves, and makes it possible to use a hemispherical combustion chamber. Thus the basic Chrysler design has a combustion chamber configuration unlike other American production cars.

On the other hand, both Plymouth and the recent Dodge truck V-8 are based upon single rocker arm shafts, resulting in a more conventional type of combustion chamber.

## Design Departures

So we have engines with a single rocker arm shaft and others with two rocker arm shafts. It remained for Chevrolet and Pontiac to break the pattern by eliminating the rocker arm shaft altogether. This was done by using pressed steel rocker arms, pivoted on spherical seats.

At the outset, Buick broke with convention and developed a valve train in which the valves were located in the vertical plane. This had the effect of reducing overall width of the engine. It also made it possible to develop a high turbulence type combustion chamber of distinctive geometry.

(Turn to page 122, please)

**How should I buy machine tools?**

**Outright purchase?**

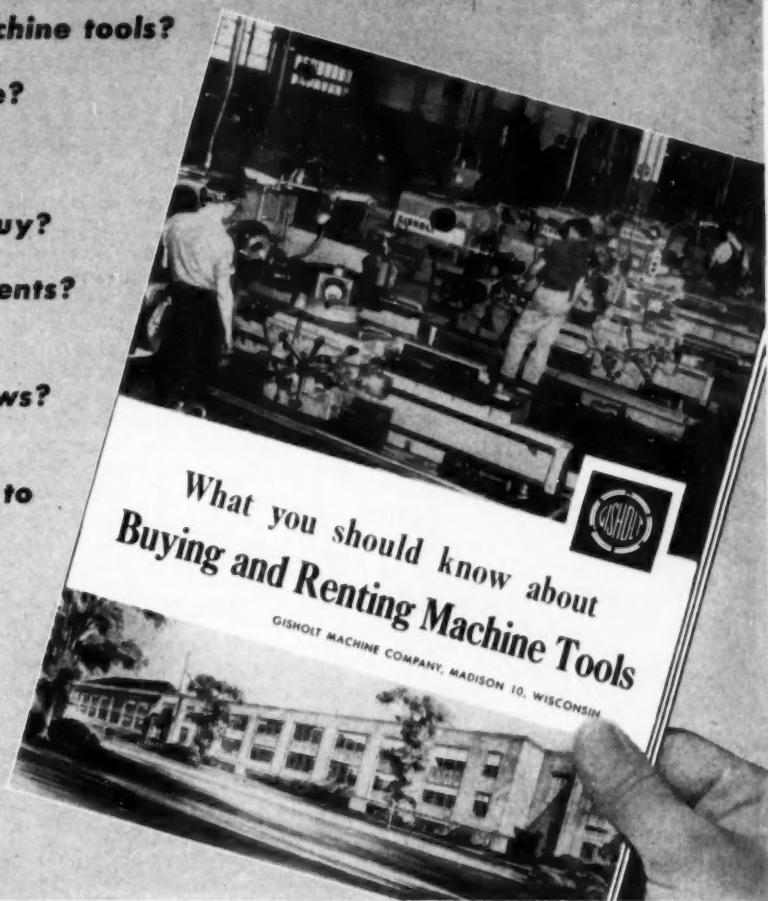
**Should I Lease?**

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## This New Gisholt Bulletin Will Help You

Recently, a lot of things have been happening which tend to confuse the outlook for buyers of machine tools and other industrial equipment. So Gisholt prepared this booklet to deal with the most important of them. The aim is to help you find the wisest answers in your particular case.

The booklet discusses leasing and time payment plans, makes cost comparisons, discusses depreciation under the new tax codes, replacement programs and the MAPI formula for machine replacement. A copy of this booklet is yours for the asking. No obligation, of course. Use the coupon.



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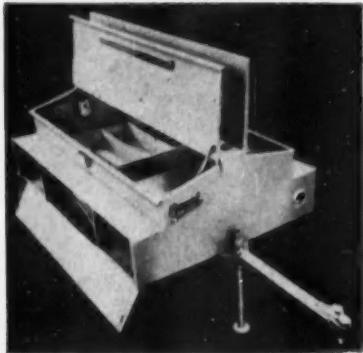
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## AIRCRAFT PRODUCTS

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### Tool Trailer

This trailer mounted Tool-master enables the maintenance crews to bring all their tools and equipment to

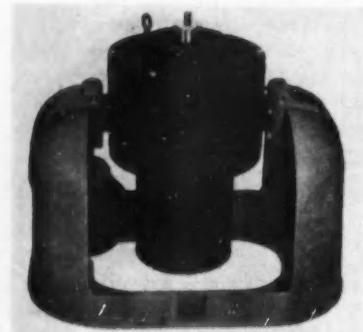


aircraft on distant aprons. The unit has a 2000-lb capacity, is tamper-proof, weatherproof, and has a sliding tray for small parts, and two six-ft work shelves. *Aeroil Products Co.*

Circle 46 on postcard for more data

### Testing Vibrator

An electrodynamic shaker, expressly designed for vibration testing aircraft structures and similar appli-



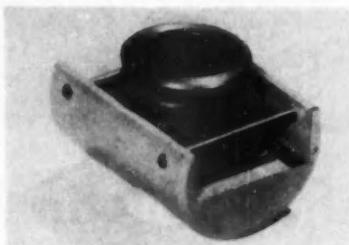
cations, has a rated force output of 100 lb and a total stroke of three in. The trunnion mounted unit, designated Model B88 by the manufacturer, may be operated vertically, horizontally or at oblique angles. The

shaker is designed for long stroke, low frequency vibration testing. Associated power supplies and control equipment provide full force performance with multiple shakers over various frequency ranges. Frequency stability is said to be plus or minus one half of one per cent. The systems also feature individual shaker force output adjustment and provision for in-phase or out-of-phase operation. *The Calidyne Co.*

Circle 47 on postcard for more data

### Self-Locking Nut

Designated series SL15, a barrel nut with self-aligning and self-locking features is designed for application where highly concentrated loads are encountered.



The nut has an aluminum barrel, a threaded steel bushing and two steel pins. The length of the barrel is slotted. The two pins go across the slotted area of the barrel and hold the steel bushing in the slot, thus providing the self-aligning feature. The shape of the lightweight barrel distributes the load carried by the steel threads of the bushing into the surrounding structure.

The nut is manufactured with internal thread sizes from  $\frac{1}{4}$ -28 to  $1\frac{1}{2}$ -12. *Shur-Lok Corp.*

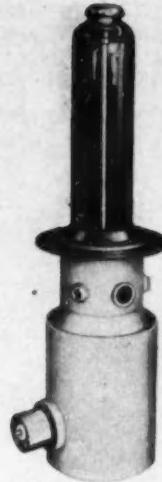
Circle 48 on postcard for more data

### Lightning Arrester

A lightweight lightning arrester for protection of aircraft communications gear has been announced. The

unit has been designed for maximum transmission of energy in the 2-24 mc band. It will divert up to six lightning impulses.

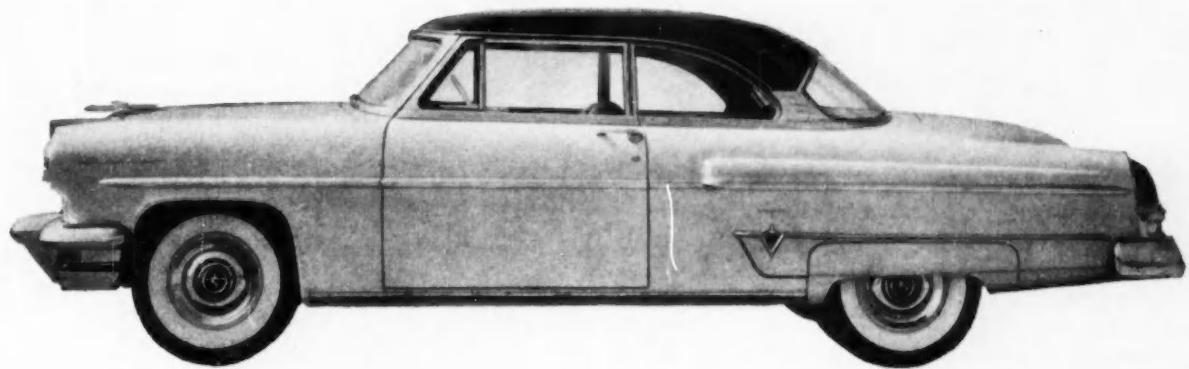
The arrester comprises a hermetically sealed stainless steel case to which is attached a pyrex glass stand-off insulator. A capacitor within the



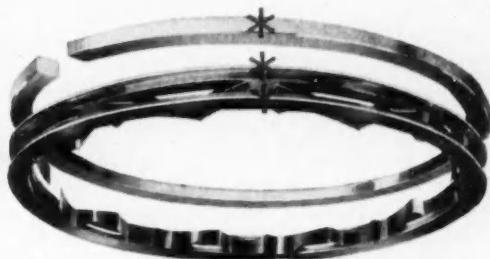
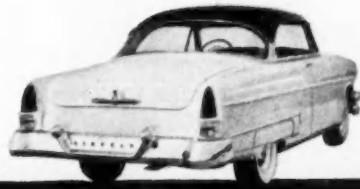
unit in series with the rf transmission line presents a very high transient impedance to the lightning pulse, which instead arcs across three adjustable spark gaps located around an aluminum rod in the center of the pyrex glass cap. The condition of the gaps is easily inspected through an observation window. The capacitor is designed for minimum attenuation of the desired rf signal, and a shunt resistor bypasses any static charge that may build up on the fin-cap antenna during flight.

The unit will not flash or indicate corona up to 10 kv within its 2-24 mc band. It has also been tested to meet MIL-E-5272 specifications for vibration, temperature, temperature shock, humidity, salt spray, sand and dust, and altitude. The unit is mounted within the shell of the aircraft. *Airtron, Inc.*

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# METALS

*Steel Orders Up with Cold Rolled Sheets in Highest Demand.  
Steel Scrap Continues Scarce. Shipments of Zinc Increase.*

By William F. Boericke

## Fourth Quarter Year's Best for Steel

Fourth quarter steel business is better than expected. Most steel executives would regard this as a major understatement. By the middle of November *Iron Age* estimated steel making operations at 78 per cent of rated capacity. This was the highest since mid-December of 1953. Incoming orders at some mills have been so heavy that acceptance has been slowed up to give old customers a chance to get under the wire.

Cold-rolled sheets, sparked by urgent buying from Detroit, have been in highest demand. Many customers have been carried along by the tide of buying from the automobile centers and appears anxious to place orders before being crowded out by big consumers. It is reported that some mid-Western mills are sold out on cold-rolled sheets for the balance of 1954.

## Less Demand for Oil Country Goods

However, cold-rolled sheets make up only about 20 per cent of total steel capacity and a boisterous market for them does not necessarily imply a strong uniform demand for all other steel products. Demand for such standard products as structurals and oil country goods has weakened seasonally as inventories are reduced for the winter months. Another factor in drying up demand has been recent Federal regulations that have caused deferment of gas pipe line projects in the Southwest. This means less steel will be needed for production of seamless pipe used in transmission of natural gas.

## No Runaway Market

Leading steel executives do not expect any runaway steel market for the rest of the year. It seems likely that operations will hold between 75-80 per cent of capacity into December, then decline slightly as the holidays approach. A 75 per cent operating rate now would be roughly the same as 80 per cent in 1953 under the then capacity rate.

But this means good business for efficient steel producers. The pickup has extended to operators of electric furnaces, specializing in stainless and alloy

steels, who have had a sharp increase in orders, and operated in October at the best rate for over a year. Yet steel company directors continue to take a conservative view of the future. It is worth noting that no extra year-end dividends were declared by directors of U. S. Steel, Bethlehem, nor Armco, although such had been generally expected.

## Scrap in Demand

Steel scrap continues to be scarce. Exports in the first eight months of the year totaled 671,000 tons, which was more than twice as much as in all 1953. The price has advanced from \$25 per ton last March to about \$34. Meanwhile, steel makers have asked the government to restrict exports, while scrap dealers are up in arms over such a proposal. It does not appear that Washington will take any steps either way.

Reasons for the huge demand for scrap are not hard to seek. British and other European steel plants are working at top capacity while our own are below. Consequently scrap moves overseas. The rearmament of West Germany will undoubtedly call for more scrap exports from the United States unless some foreign orders are diverted here.

## Large Scale Use of Rare Earths Forecast in Steel

An addition of two pounds or less of rare earths per ton of steel will improve the hot workability of steel, increase the fluidity of the melt, and lower the sulphur content, it was declared before the Senate Minerals Committee. While immediate success was achieved initially in use of rare earth compounds on stainless steels, subsequent work has been done on standard steel which has reduced tears, slivers, and cracks during the rolling operations. Use of the rare earth compounds has been adopted recently by a major steel plant for use as standard procedure in all steels of the .13-.28 carbon range.

## Zinc Statistics Highly Encouraging

The October figures from the Zinc Institute provided the best reading of the year for the zinc industry. Shipments increased sharply to 90,400 tons, of which domestic consumers took 78,800 tons, the highest monthly total of the year. Reflecting relatively low production and high shipments, slab stocks at the end of the month dropped to 152,100 tons, the lowest point reached since September, 1953, and a 25 per

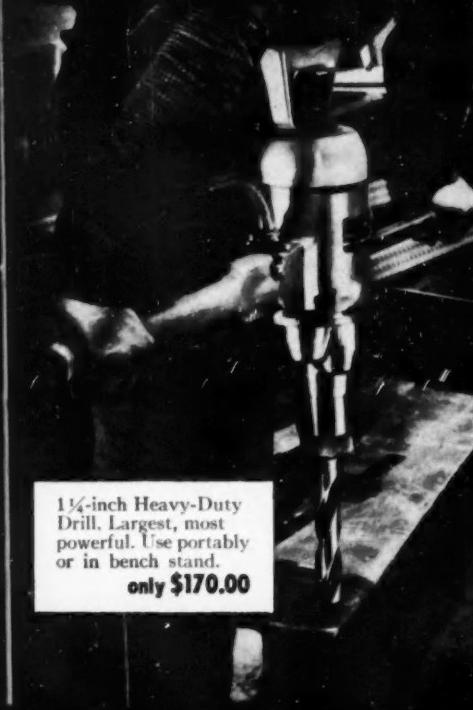
(Turn to page 100, please)



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## British Show Reflects AUTOMOBILE INDUSTRY EXPANSION

(Continued from page 72)

indicated changes in trim and appearance. The L-head engine practically went out of existence with this year's show. Compression ratios have increased, but there is a tendency to offer higher ratios as optional. Chromium plated top rings are more general, oil-immersed ignition coils are frequent and horsepower per litre of piston displacement is not infrequently as high as 55 on standard production engines.

Except that clutches are frequently hydraulically operated, there is very little change in transmissions. The British buyer is still objecting to the higher initial cost and the greater operating cost of automatic transmissions and these are only found as optional equipment on such costly cars as Rolls Royce, Bentley, Armstrong-Siddeley and Jaguar. The Lanchester with the Hobbs epicyclic automatic is exceptional. Borgward showed a full automatic transmission on a car with an engine of only 122 cu in. displacement. Operating economy is being sought by the use of an overdrive, usually attached to the tail shaft of the gearbox, the epicyclic gears being electrically operated from the steering column.

Unit frame and body construction is extending, particularly among the big constructors. With the exception of the French Panhard, there was no all-light alloy car in the show, although aluminum paneling had its place on the more expensive bodies. Plastic bodies have not yet reached the production stage. Only two were displayed, one of these being a race car.

The small Diesel, so prominent in the commercial vehicle show, was completely overshadowed in the passenger car exhibition. Apparently no attempt is being made to convert the private owner to its use, although it is growing fast where big mileages are involved.

Prominent among the very few entirely new models at the London show was the Sprite presented by the Lanchester Co., an associate of the Daimler organization. With a four cylinder valve in head engine of 99 cu in. piston displacement, it featured the use of the Hobbs automatic transmission, presented for the first time on a European passenger car. It was also the first use of an automatic transmission on a car coming into the

smaller piston displacement class and of comparatively low price. The Lanchester, which will be in production in June or July, is listed at \$2130, plus purchase tax. The Lanchester Daimler organization has had a lot of experience of hydraulic couplings and pre-selector gearboxes, but instead of adopting this type, they use the Hobbs four speed planetary unit and make a concession to British conservatism by providing manual overriding control.

In general design the engine is similar to the larger models used by Daimler, the four cylinders being 2.93 by 3.53 in. bore and stroke, with a single casting cylinder block and crankcase. Compression ratio is 7 to 1, and output 60 hp at 4200 rpm. The drive shaft is open and a Salisbury hypoid rear axle is used with a final ratio of 4.1 to 1. Unlike earlier Lanchester models, the Sprite is unit frame-body construction. A feature of this model is that the fenders are a part of the body construction, but they are partly concealed by a rear hinged hood built up of steel tubes with light alloy paneling. This hood carries the grille, the headlamps and the sidelamps. The Sprite has a wheelbase of 99 in. and in the sedan version weighs 3552 lb.

Austin uncovered the new Cambridge series at the Paris show, but reserved the A-90 Six Westminster as the London show surprise. This model replaces the A-70 Hereford and with its six cylinder, 161 cu in. engine it costs less than the four cylinder Hereford it replaces, price on the home market (minus purchase tax) being \$1562. The output is 85 hp at 4000 rpm, maximum torque is 130 lb-ft at 2000 rpm, and weight is 2912 lb. General layout is very similar to that of the Cambridge series, with the same frontal treatment.

Wolseley, in the same B.M.C. grouping as Austin, came out with a third model, the Six-Ninety. It has a six-cylinder engine of 160.9 cu in. displacement which develops 92 hp at 4280 rpm. An innovation is the dropping of rear leaf springs for a system of coil spring suspension. The rear axle housing is located by two radius arms which run from the stampings welded to the axle tubes, diagonally forward to rubber-bushed bearings on the third cross frame member, close to the chassis center

line. A rod is secured to the end of the right radius arm and connected up to the left-hand side rail. Front suspension is by torsion bars, with pressed steel support arms.

The Rootes Group introduced the Hillman Husky, an all-purpose car developed from the Hillman Minx, with many of its mechanical features, including unit body and frame construction and a 77 cu in. L-head motor. It has all the appearance of a conventional passenger car, with two doors and in addition a rear entrance giving access to a baggage compartment which can be enlarged by folding down the rear seats. For the Hillman Minx a change has been made to a valve-in-head engine of 84.8 cu in. displacement developing 43 hp. The side valve engine, however, is retained for a more simplified version of the Minx and for the station wagon. Apart from the engine there are few changes, but because of the higher power available the final drive ratio is 4.77 to 1 compared with 5.22 to 1, the gearbox ratios remaining the same.

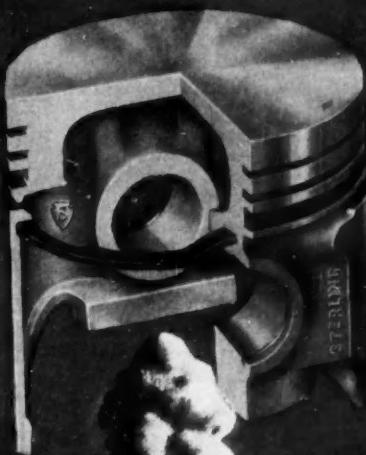
The Sunbeam for 1955 has become the Mark III and has a four cylinder engine very similar to that of the Humber Hawk, with output stepped up to 80 hp by raising the compression ratio to 7.5, increasing the inlet valve diameter and providing separate exhaust ports. The Laycock De Normanville overdrive is available as optional equipment. This can be brought into operation on high only and passes out of engagement when a down change is made.

Continuing the two models, the six cylinder Velox and the four cylinder Wyvern, Vauxhall (General Motors) has added a de luxe edition of the six designated the Cresta. Mechanically it is similar to the Velox with many additional items as standard equipment, including leather upholstery, white wall tires, heater, electric clock, etc. The former assembly of steering column and box has been replaced by two separate rigidly-mounted units—the column assembly and the steering gearbox. These are connected by a flexible coupling which absorbs road shocks and cushions the steering.

Daimler continued in the big car field with 213 and 274 cu in. six-cylinder engines, using a fluid flywheel and preselector gearbox. On the 274 cu in. Sportsman model the preselective

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transmission gives overdrive on top.

Sports cars were a strong feature of the show, with practically a dozen of various types on display. Prominent because of the success it has had in competitions this year was the Jaguar D type, now going into limited production. This 210 cu in. six approaches very closely to the pure racing type, with an output of 250 hp at 6000 rpm and a special light alloy unit body and frame. The basic unit is the XK 140, which is offered in three models, and has had its power stepped up from 160 to 190 hp at 5500 rpm. This is obtained by increasing the valve lift and by changes in the cylinder head to assure better breathing. The three models can be boosted to 210 hp by enlarging the throat diameters of the inlet ports to 1½ in. A new close-range gearbox is used to get full benefit from the higher engine power, and the Laycock De Normanville overdrive is provided with manual control. Among the chassis improvements are rack and pinion steering and larger diameter and stiffer torsion bars for the front suspension.

Austin Healey came forth with 100S, the power of which has been stepped up from the original 90 to 132 hp. The four cylinder engine has a piston displacement of 162.2 cu in., a compression ratio of 8.3 to 1, and is said to peak at 4700 rpm. It was shown with a two-passenger runabout body.

Bristol developed logically from the

403 to the 404 to produce the 405 sportsman's sedan for the 1955 season. A four-door car, it is powered by a six-cylinder, 122 cu in. engine, now giving 105 hp at 5000 rpm. This has a four bearing crankshaft and pushrod-operated inclined valves in a light alloy head. Chassis layout is more or less conventional with four speed transmission and the optional fitting of the Laycock De Normanville overdrive. Front wheels are independent with transverse spring and support arms; and rear suspension is by longitudinal torsion bars.

The two passenger version of the Aston-Martin, produced by the David Brown Corp., has a 178 cu in. twin overhead camshaft engine, with a compression ratio of 8.5 to 1, developing 180 hp at 5500 rpm. In the marine section, where it was labeled as being for hydroplane use, was the Coventry Climax all light-alloy V-8. This purely competition engine has not yet gone into production but is expected to be fitted to cars next season. At the present time four carburetors are used, but development work is being carried out with direct injection. Another new engine promised for next season was an opposed, aircooled four of 91½ cu in., produced by Kieft, entirely in light alloy, with overhead camshafts, driven by chain. It is not sufficiently developed for power output to be quoted. Weight with starting gear was 320 lb.

Kieft displayed an open two passenger body on a tubular chassis

frame which was used for the whole of last season for racing purposes. The only other all-plastic body in the show was a handsome sports sedan by Jensen. This was a two-door sedan with a wrap-around windshield, a wrapped round rear glass and a rear-hinged hood carrying the head, side and parking lights, and an oval opening for intake to the radiator. This special car was powered by a 244 cu in. Austin valve-in-head engine.

Marston Excelsior Co. displayed a fibre-glass hard top for the Triumph TR 2, to allow it to be converted from an open two-passenger body to a fixed-head coupe, as desired. On the Singer Hunter model, use was made of fibre-glass panels for the top of the hood and the fender valences. Generally, British manufacturers are proceeding very cautiously with regard to plastic bodies.

In connecting with racing and sports models, it was ascertained that the new Mercedes, which were unbeaten this year, have positively opened and closed valves without any valve springs, the operation being by two cams per valve, side by side on the same camshaft and two rockers working scissors-fashion on the stepped valve stem. The valves were not brought down completely to their seats by means of the cams, final seating being by compression or firing pressure. Power output of these direct injection 152 cu in. racing engines is stated to be 270.

## METALS

(Continued from page 96)

cent cut from the peak of 209,800 tons last May.

As was fully expected, Washington asked lead and zinc producers to offer metal for shipment to the stockpile through January 15, 1955. Such metal must be of domestic origin and mined since April 15, thus closing the door to zinc mined abroad even if smelted in this country. This is the sixth straight month that the Government stockpilers have asked for zinc and lead.

### Zinc Demand Is Up

Demand for zinc picked up sharply in November. Die-casters have been in the market for more metal as the automobile industry shifted into high gear. The higher rate of steel pro-

duction affected the galvanizers. Feeling was quite general that a price increase to 12 cents per lb. was indicated before the end of the year, but there was less likelihood of any increase in the lead price.

Lead consumption has been rather disappointing in some lines and the Government's figures show a 10 per cent drop in consumption for the eight months period January-August, 1954, as compared with last year. Since February the shipments of automotive replacement batteries have been less every month of 1954 compared with 1953. However, the margin in September was narrower and it seems likely that comparisons in the fourth quarter will be improved.

### Copper to Remain Firm

Somewhat to the discomfiture of the Chilean government, Washington came to the rescue of the domestic copper consumers by first diverting

26,500 tons to industry that was destined for the stockpile and followed it with another 25,000 tons. This appears to take fabricators safely over the hump.

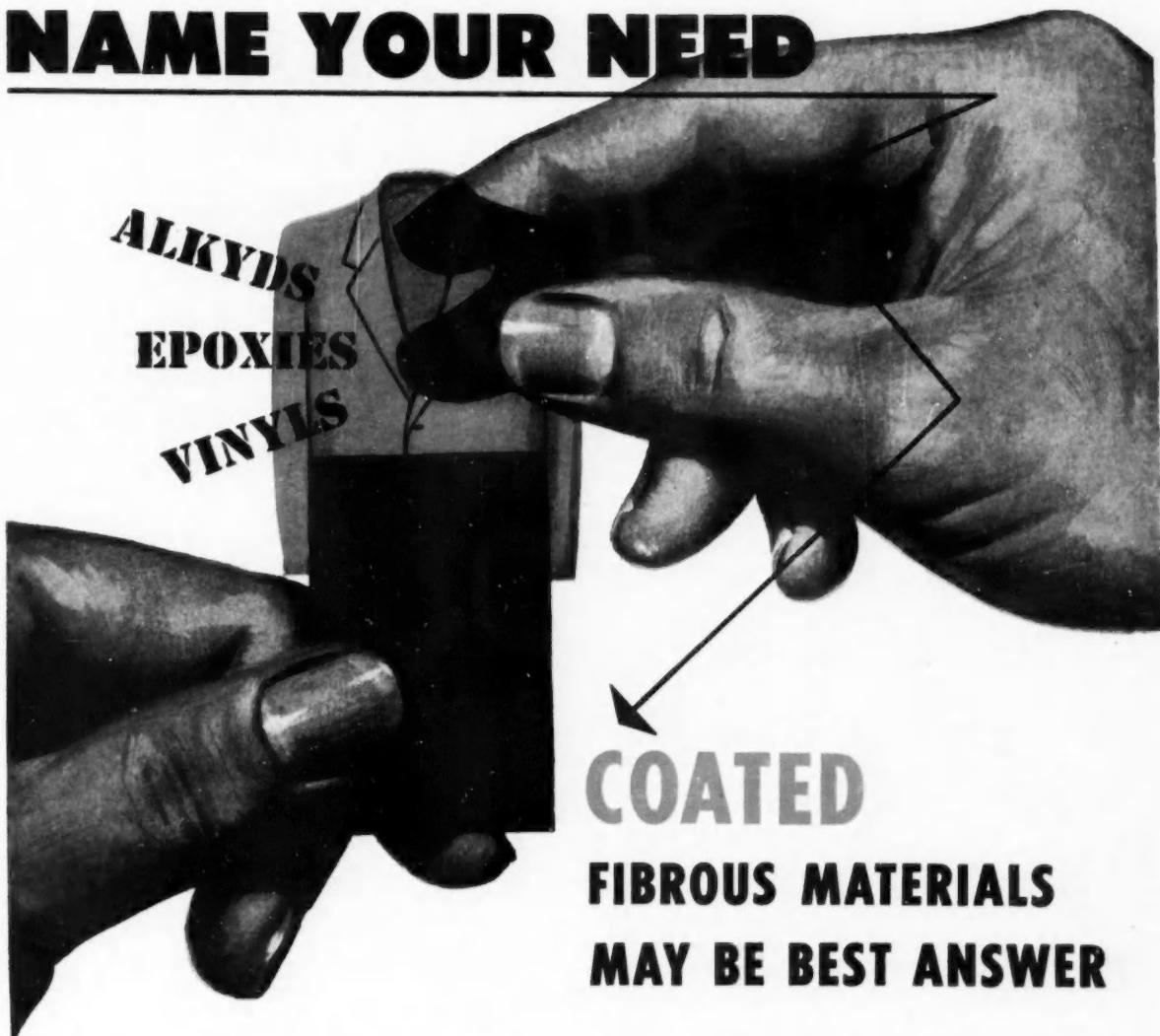
Nevertheless, copper is in scarcer supply and is likely to remain so for the rest of the year and perhaps into the first quarter of 1955. While the metal from the Government is most welcome, it is generally not in shapes that are wanted by the wire mills which were hardest hit. They will have to convert the cathode copper before they can use it, with added delay and cost.

Yet there is little thought in the trade of raising the copper price. Producers are generally in sympathy with the State Department's thesis, that a stable U. S. copper price is to the best interests of all, and sharp price fluctuations caused by temporary shortages could cause copper to be increasingly subject to competition from aluminum.

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# Union Demands on Automobile Industry

Demands that the UAW-CIO will make on the automobile industry next year were recently spelled out in greater detail by union officials. While industry spokesmen have declined formal comment on the issues to be presented when contract talks are opened in April, it is certain that they are being carefully studied.

The package the union is talking about has been estimated to cost 40 to 50 cents an hour, and certainly is the most far-reaching since unions gained widespread recognition in the industry. However, experienced labor relations officials say that it is customary union strategy to ask for a great deal more than is expected in order to leave room for compromise.

Nonetheless, the industry is not taking a light view of the upcoming struggle, which could result in a long and bitter strike. Whether that actually will occur, however, is something no one is willing to forecast.

As expected, the chief demands will be for a guaranteed annual wage, plus a basic wage increase of more than 10.3 cents an hour. Other demands include: increases in pension payments; either one or two instead of five-year maximum contracts; increased employer contributions to health insurance premiums; freezing of accrued cost-of-living allowances into the permanent base rate; increased premium rates for Saturday, Sunday, and holiday work; and a preferential hiring system for laid-off workers. Briefly, here are some details of the union's demands:

## Guaranteed Annual Wage

Workers with two or more years seniority would be guaranteed 40 hours of work or 40 hours pay, unless notified one week in advance that they are to be laid off for the entire week. When notice is given, eligible workers would be paid for each week of unemployment an unspecified sum sufficient to "maintain normal living standards."

This presumably would be normal pay, minus transportation and perhaps other expenses incidental to being on the job. The guarantee would run for a maximum of 52 weeks, provided the employee has credits enough accumulated at the rate of one credit-week for each two worked.

Employees with less than two years seniority would be guaranteed one

## By Leonard Westrate

week of income for every two weeks of accumulated seniority. In other words, an employee with 50 weeks seniority would be eligible to receive payments for 25 weeks before his guarantee expires.

The plan, as advanced by the union, would involve state unemployment benefits, payments by employers on a current basis up to a certain unspecified percentage of payroll, and employer contributions of a specified, but as yet indefinite, amount into a reserve fund.

## Wage Rates

The current seven-cents an hour cost-of-living allowance would be frozen into present base wage rates as a permanent increase. In addition, the union asks that 5.3 cents an hour be added to the basic hourly rate to compensate for flaws in the improvement factor, which has been in effect since 1949.

The union contends, through an involved mathematical formula, that the workers have been short-changed on the improvement factor by the aforementioned sum. Addition of a five-cent improvement factor due when the new contracts are signed would make the increase 10.3 cents immediately.

## Pensions

Pension contributions by employers would be increased from \$1.75 monthly to \$2.50 for each year of service so that maximum pension benefits would be increased to \$167 a month, including social security, at age 65 after 30 years of service. The current maximum is \$144.50 a month. In addition, the union asks that the period during which employees may accumulate pension credits be increased to 40 years from 30 years, which would raise the maximum to \$192.

There is some indication that the automobile companies may want to drop the escalator and annual improvement clauses, in which case the union then will insist on one-year contracts. When these are included, however, the maximum term will be two years, according to the union.

## Health Insurance

Companies would pay the entire

premium instead of one-half, as at present, for insurance covering hospital care and medical and surgical service. It would cover all active and retired workers and their families.

## Premium Pay

Employees would be paid time and one-half for work on Saturday, double time for Sunday, and triple time on holidays, regardless of whether or not they had put in a 40-hour stint during the regular five-day week. Under current contracts, overtime is paid on any of these three days only when the employee has worked 40 hours during the regular work week.

## Preferential Hiring

In large companies with many plants, workers laid off in one plant would be given preference in hiring at other plants within the same company. All companies would have to give preference to laid-off workers within the automobile industry when hiring workers in their immediate area.

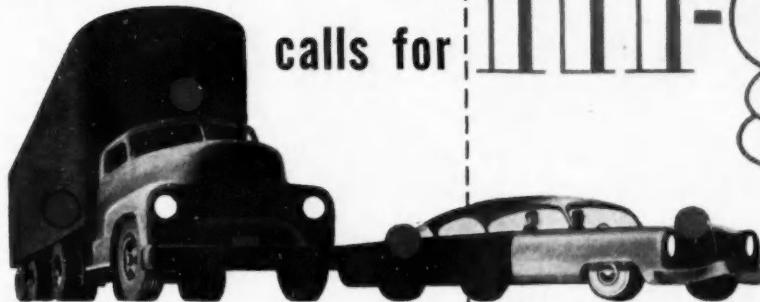
## Proper Foundry Practices

(Continued from page 68)

and every shell formed at exactly the same temperature. At investment time, each shell is poured at exactly the same temperature. Mr. Donner stated that this particular casting was tried unsuccessfully in green sand, dry sand, core mold, and lost wax. It has only been made successfully, through the shell mold process.

Speaking on cast weld construction, G. J. Gibson, project engineer of the sponsoring company, stated that stainless steel castings when welded should pass X-ray, Zyglo, and all the necessary mechanical and physical tests. Cast weld construction should be considered if the design of the product involves unfed or exceptionally difficult-to-feed hot spots. If the design will have to make use of large awkward coring or relatively long slender castings, then cast weld construction should be considered. Sometimes, a design will be made up of component parts which would complicate the molding or casting of the main section of the casting, and in this case, cast weld construction should be utilized.

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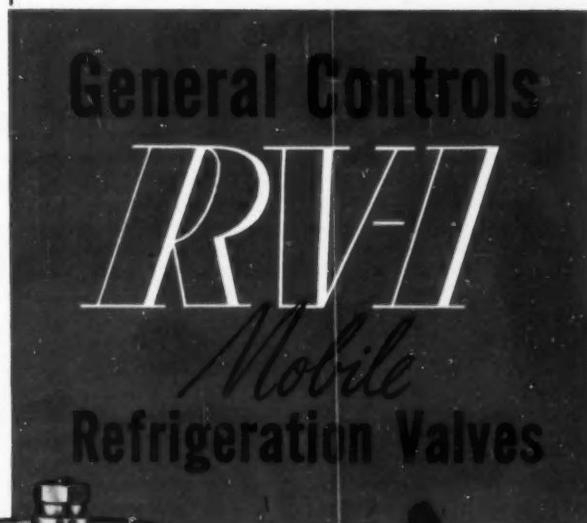


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## Equipment for Making Self-Propelled Howitzer

(Continued from page 66)

shown in the foreground at the left.

The hull requires other operations, of course, before it is ready for assembly. One of the major steps is the facing, turning, and boring of the large diameter turret ring which may be seen in the hull in the center foreground. This job is done in one setting in the 25-ft Niles boring mill located at the right.

Following machining, the hulls are prepared for the final assembly line by the installation of wiring harness, plumbing lines, and a variety of accessories that must be in place before the Continental power plant is installed. Moreover, since these items are pretty well buried in the interior of the hull the entire wiring harness is electrically inspected 100 per cent before installation.

An interesting operation is attachment of the track. As illustrated, the procedure has improvements stemming from war time experience. First the two tracks are laid flat on the floor to permit the vehicle to roll onto them. Then the rear end of one track is picked up by a long cable leading from the power winch in the foreground and carefully brought over the upper wheel surfaces to the front end where attachment is made. The winch rolls transversely on rails, is transferred from one side to the other.

The big gun mounts are fabricated and machined by a sub-contractor, then are moved to a short assembly line. Here many final details of machining and sub-assembly are completed, the intricate electrical control system installed, and finally the 155-mm gun barrel assembled in place. The complete assembly then is ready for transport to the final assembly line for installation in the hull.

Spray painting of the hull and later, of the entire vehicle, is done in out-sized Binks water-wash spray booths.

It is also of interest that all small parts are routed to a Cincinnati Cleaning Machine Co. unit where they are chemically cleaned, then given a phosphate coating for protection. From the washer the parts move on a small conveyor directly to a small Binks spray booth for painting.

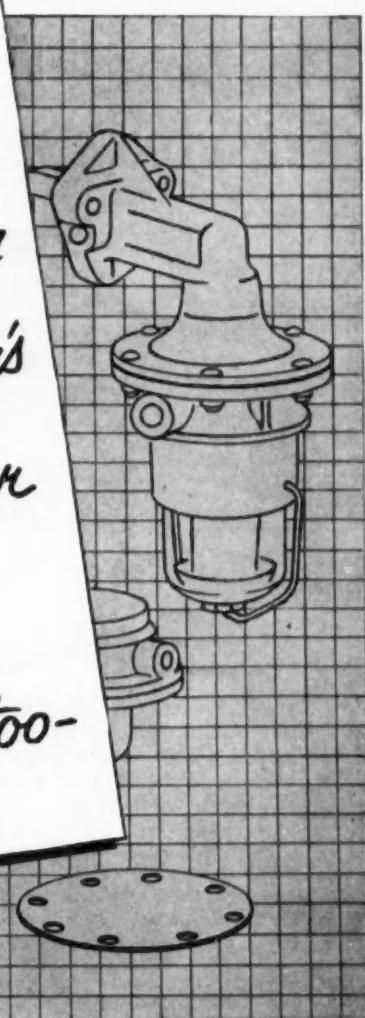
Although this brief description does not permit of details of small parts fabrication, attention is drawn to the hardening of the big bull ring

**MEMO**

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TO: Purchasing

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diaphragm to withstand today's  
premium gasolines in a new  
fuel pump operating at higher  
speeds and temperatures  
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The general properties of Du Pont "Fairprene" include toughness, flexibility and resistance to flex fatigue and abrasion, as well as resistance to aging from exposure to air, gasoline, kerosene and oil or

grease—even at extreme temperatures. "Fairprene" comes in sheet stock, coated fabrics and adhesives. Among the many automotive uses for "Fairprene" compositions are weather-stripping cements, bearing seals, gasketing and diaphragms.

For more information—or to ask Du Pont's technical staff to work with you in developing special grades of "Fairprene" to meet your requirements—fill in and mail the coupon today.

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*synthetic elastic compositions*

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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

\*\*"FAIRPRENE" is Du Pont's registered trade-mark for its line of products made from synthetic elastomers available in the form of coated fabrics, sheet stocks without fabric insert and adhesives.

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Fabrics Division, A. I., Fairfield, Conn.

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 Please send me further information on "Fairprene" synthetic elastic compositions.

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*Designing equipment for effective two color marking at production rates is just one example of how Markem solves industry's marking problems.*

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*This Markem Method has been providing a single source for savings in time, effort and inventory... since 1911.*

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**MARKE M**  
... TO MAKE YOUR MARK

for the final drive. The bull ring is actually a large spur gear containing 61, 4P teeth. Latest practice is to harden gear teeth by induction heating in a two-stage cycle. They are first given a preheat in a Westinghouse 60-cycle induction heating machine, heating to a temperature of 700-800 F. Hardening then is done in an adjacent Westinghouse induction heating machine, operating on 3000-cycle high frequency current. It is of interest that the entire cycle has a floor-to-floor time of 18 to 20 pieces an hour.

Upon completion of the heating cycle, the fixture is lowered to immerse the gear in an oil quench bath in the base of the machine.

## Sectionized AUTOMATION

(Continued from page 49)

from station to station within the sections. The secondary units move the parts from one section to the next, during the time that the tools are cutting. As shown in one of the accompanying illustrations, the secondary transfer unit of Section 1 is shown delivering the workpiece to Station 1 of Section 2. Provision has been made to attach automatic banking units to the secondary transfer units if and when it is necessary to increase production.

Automatic inspection devices are provided in strategic positions throughout the machine. A typical unit at the end of Section 3 is illustrated. With the parts moving from right to left, the bank faces are drilled after which the parts are lifted and rotated 360 deg to dump the chips. In the last station, the holes are probed. If the part does not pass the test, the section is automatically shut down.

A number of special features to facilitate maintenance are provided. They include complete interchangeability of all standard and special parts, J.I.C. standard construction, manifolded hydraulic valves and limit switches, hardened and ground ways, automatic lubrication, and provision for quick and easy removal of the cylinder block from every station in the machine.

**AUTOMOTIVE INDUSTRIES**  
*Keeps You Informed*

# Tests for Determining Mechanical Properties of Alloy Steels

*This is the sixth of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.*

The types of tests used to evaluate the mechanical properties of an alloy steel depend upon the end use of the steel involved. Generally speaking, mechanical properties are determined by tension, bend, and hardness tests, and by a group of special tests employed on tubular and wire products. These are discussed briefly in the following paragraphs.

(1) Tension tests provide means of determining tensile strength, yield point, yield strength, proof stress, proportional limit, per cent elongation, and per cent reduction of area. This sort of test subjects the steel to stresses resulting from the application of an axial tensile load to the specimen ends, the load being sufficient to rupture the specimen.

(2) Bend tests often aid in determining the ductility of steel. The severity of such a test depends largely upon the bending radius used. Several factors influence the length of radius, including thickness of the test specimen, width of test specimen, direction of test, chemical composition, tensile strength of specimen, etc.

(3) Hardness tests determine the steel's resistance to penetration. This characteristic is most commonly measured by the Brinell Test or the Rockwell Test. In the former, pressure is applied to the surface of a test specimen by means of a ball 10 mm in diameter. Two diameters of the resulting impression are measured and averaged, the average being used to determine

the hardness number by means of a conversion table. In the Rockwell Test, the degree of hardness is read on a gage; hardness is measured by the penetration of a diamond point or a  $\frac{1}{16}$ -in. steel ball. Rockwell "C" scale readings are used in connection with the diamond point; "B" scale in connection with the steel ball. The "C" and "B" are the most commonly used of the several Rockwell scales.

(4) Special additional tests are often made on tubular and wire products. These include such items as hydrostatic and manipulating tests, and torsion and wrapping tests, the latter two being used only with wire.

The subject of testing and its relationships to the end uses of alloy steels has been given broad study by Bethlehem metallurgists. If you desire, they will be glad to discuss any phase of it with you, and also give unbiased opinions on such matters as analysis, proper selection of steels, machinability, etc. Call for their services at any time.

And when in the market for alloy steels, remember that Bethlehem can furnish the entire range of AISI standard analyses, as well as special-analysis steels and all carbon grades. Your inquiries will be welcomed.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.  
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

**BETHLEHEM ALLOY STEELS**



## Aircraft Hydraulic Conference

(Continued from page 53)

It was readily conceded that costs are much higher. But operators feel this is justified by the assurance of safety to passengers and equipment.

Synthetic safety fluids, according to Monsanto's Langenfeld, will run \$8 to \$10 per gallon for jet engines, \$15 to \$18 per gallon for turboprop engines. On the other hand, as certain levels of usage are attained in

the future, the cost of these materials is expected to be reduced materially.

One of the highlights of the meeting was the presentation of a paper by Boeing's E. Pfafman, describing the design of the hydraulic system for the Boeing 707 transport. To satisfy safety requirements it was divided into two independent systems—left and right—each with its own separate power source and distribution. The hydraulic tanks are located in the wing tip well away from the passenger area, providing short pump suction lines, a gravity head to the pumps, and provision for drainage

overboard without fear of ignition or reentry.

For emergency operation, a cross-over valve is installed to allow operation of flaps and landing gear from either the left or right systems. An additional source of emergency power is supplied by electrically-driven pumps for each system, each with its own reservoir. Hydraulic power is provided for the brake system, landing gear operation, nose steering gear, flap and wing spoiler operation.

How the Convair 340 main hydraulic system has been modified to improve ground cooling was described by D. M. Moore, Consolidated Vultee. The modification includes the adoption of both a variable displacement and fixed displacement pump. The system consists of a pump on each engine, an emergency electric pump, an unloading valve, a by-pass valve to the depressurize part of the system during flight, an accumulator, brake valves, selector valves to control landing gear operation as well as the other functions—wing flaps, entrance door, windshield wiper drive; addition of a hydraulic motor driven fan to force air through the refrigeration heat exchanger during ground cooling, and a reservoir with an internal micronic filter. Much of the system is conventional, the areas pertinent to the new features being affected primarily by the single variable displacement pump installation.

E. W. Kesselman, Lockheed, touched on some recent improvements in the hydraulic system for the Constellation. Although this involves a large number of items, the speaker emphasized four developments of outstanding character: the new crossover system, landing gear retraction speed-up arrangement, adoption of the Vickers light weight pump, and an electric-motor-driven hydraulic pump installation for the emergency extension and brake system.

In a paper describing the hydraulic aspects of the Douglas cabin supercharger drive, from the DC-6 through the DC-7 models, W. W. Thayer mentioned that Douglas makes three basic types—the standard supercharger, increased capacity supercharger, and the increased power type for the DC-7. However, the chain of circumstances leading to progressive developments over the years has actually involved the use of nine different superchargers, plus an extra one for the DC-7 which is essentially a DC-6B supercharger with variable displacement pumps.

The author undertook an examination of the various types of superchargers now in use by means of slides.

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THE ball stud shown here is a perfect example of the precision methods and quality material that go into the production of all Brown Hardened and Ground Parts. Twelve separate operations are employed to produce this vital part. Every feature about this ball stud has to be right—every feature is. It has strength, wear resistance, precision fit, true-ground spherical and tapered surfaces, close inspection and strict uniformity.

Brown Hardened and Ground Parts have been serving the automotive industry for over 40 years. We refer you to any of our long list of satisfied customers. For information pertaining to your own requirements, simply write or wire.

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**offers more value to car buyers  
... more profit to you**

• Leather, first choice of stylists for fine car interiors, is the best choice *any* car buyer can make. For nothing can match its beauty, durability and practicality. Costing only slightly more than good seat covers, genuine upholstery leather gives far more value to buyers and added profit on every sale to you.

Genuine upholstery leather is the logical material for car interiors because it resists hot sunlight and bad weather . . . tearing, fading and hard wear. Leather is easy to "slide" on—easy to care for—comes clean with ordinary

soap and water. Its colors and finishes offer a choice that meets any style demand. And don't forget!—genuine upholstery leather actually *improves* with age and use . . . takes on a rich patina unduplicated in any other material . . . increases the trade-in and resale value of any car, an important consideration to all car buyers.

No substitute can add so much extra value to a car for so little. No other material can offer you the added profit of genuine upholstery leather. Why sell anything less?

**WRITE FOR THESE SALES-TIPS**

The new, free booklet, "All About Genuine Upholstery Leather," is yours for the asking. It contains some facts about leather that will convince you and your customers that genuine upholstery leather is the best buy in any car. Write for it today. There's no obligation.



**Only Genuine Upholstery Leather  
Wears as Well as It Looks**

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- THE ASHTABULA HIDE & LEATHER CO., Ashtabula, Ohio
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# MESSAGE TO AN ENGINEER THINKING ABOUT THE FUTURE— HIS FUTURE

Take a few moments now to review the progress of your career. Does your present position offer you a future that fully utilizes your creative abilities?

Compare your present assignment with the diversified, stimulating pursuits that increase the inventive challenge of Fairchild's team of qualified engineers. These men are working on engineering advances for the famous C-119 Flying Boxcar and the soon-to-be-produced C-123 Assault Transport. More than that, they are developing tomorrow's jet fighters . . . special reconnaissance aircraft . . . jet bombers and transports. The men at Fairchild know that *planned* project diversification keeps them in the forefront of the field of aerodynamics.

Gracious country living only minutes away from urban Baltimore or Washington . . . paid pension plan . . . an excellent salary with paid vacations . . . ideal working environment . . . generous health, hospitalization and life insurance . . . and the many other benefits of a progressive company add to the pleasure of working with Fairchild.

You'll be investing wisely in a secure future if you take time today to write to Walter Tydon, Chief Engineer, outlining your qualifications. Your correspondence will be kept in strict confidence, of course.



## Machine Tool Automation at Pontiac

(Continued from page 60)

drilling various holes in the ends of the head and for drilling oil gallery holes. This machine is equipped with automatic inspection stations and reject stations.

The head is then loaded into a W. F. & John Barnes 17-station machine for drilling, reaming, chamfering, and boring operations. In this huge machine, the valve guide holes are semi-finish and finish reamed and the valve throats are finish reamed. This transfer unit drills rocker stud holes for the rocker arm supports since the engine does not use a rocker shaft. Valve guide holes when finished are thoroughly brushed for the removal of foreign matter before the valve guides are pressed in. Valve stem holes are next bored part way and the valve seats are generated. After a spotfacing operation on the guide bushings and rotating the workpiece 90 deg so that the joint face is upright, the eight valve stem holes are reamed and then taper reamed at 0.0015 in. per in.

When the head leaves the W. F. & John Barnes machine it is conveyed to a Lapointe unit for the final broaching of the joint face. A Cincinnati profile mill is then utilized for the finish milling of the combustion chambers.

Automation carries the work from the profile mill to a W. F. & John Barnes transfer unit which counterbores and chamfers the four spark-plug holes and taps specified holes. During the course of machining operations in the Barnes unit, the workpiece moves through two positioning devices. After washing the heads in a Centri-Spray, they go to a Snyder machine where the Welch plug is inserted. This machine also gives the heads a leak test before shipment to the assembly area.

## BOOKS...

SAE MANUAL ON BLAST CLEANING, published by Society of Automotive Engineers, Inc., 29 West 39th St., New York 18, N. Y. Price, \$2, members; \$4, non-members. Complete and up-to-date data on blast cleaning are covered in this new manual. The men responsible for the booklet have extensive and varied experience with blast cleaning. Thus, they have been able to produce a handbook loaded with practical information for engineers, management, and shop personnel needing specific advice concerning the blast-cleaning process.

*Here's How*

# GITS

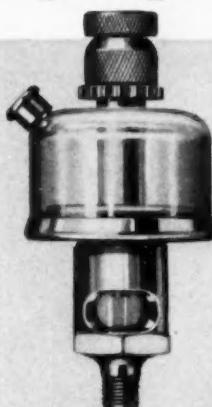
*Helps Give*

## Built-In Low Cost To YOUR Equipment



OIL CUPS

Accurately machined from a solid brass one-piece forging, this oil cup permits safe, dependable application of lubricant at very low cost. Used widely on motors and small machinery requiring side oiling. Style L—No. 1202.



SIGHT  
GRAVITY  
FEED  
OILERS

Rate of oil flow regulated by needle valve, directly observed through sight glass in stem.

Shut-off knob does not affect needle valve adjustment. Visible oil supply. Non-breakable. Tops in convenience and dependability, at low cost. Style NFU—No. 3602-A.



OIL HOLE  
COVERS

This model is designed to fit into a simple drilled hole. Ideal for use on small motors, generators, starters and light machinery—for dependable oil hole protection at moderate cost. Larger sizes frequently used as filler caps on tanks or reservoirs. Style R—No. 305.

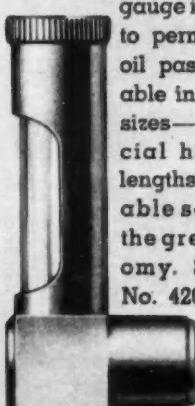


GEAR  
CASE  
GAUGES

This oil gauge plug permits instant checking of oil level within a transmission or gear case. For use where construction permits insertion in tapped hole. A valuable addition to any such equipment—at very low cost. Style BW—No. 4042.

### FORGED BRASS GAUGES

Heavily constructed in a single piece from forged brass—this gauge is also drilled to permit generous oil passage. Available in many stock sizes—and in special heights and lengths. For dependable service with the greatest economy. Style FG—No. 4204.



### SIGHT GAUGES

For use where rate of oil flow must be regulated to suit changing operating conditions.

Needle valve permits extremely accurate adjustment of oil feed.

Sight glass provides direct observation of rate of oil flow. Accuracy and convenience at a moderate price. Style PF—No. 4290.

Don't price yourself out of the market. When you design proper lubrication into your equipment, specify GITS Lubricating Devices—the widest selection available anywhere. The items pictured above are only a few of our many thousands of lubricating devices. At the design stage, get the GITS story. Free Engineering Service. Send NOW for your free Catalog.

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Clip this page for handy "rough reference"

# Get Profitable Methods plus Advanced Machine Design

from...

**SUNDSTRAND**  
"Engineered Production"  
Service

## High Production Methods On Low Production Jobs

Using a Sundstrand Model 33 Rigidmil and universal magnetic fixture for machining tool blocks, cam bars, motor bracket slides, etc. reduced the time on the average of 50% over the previous method. Lot sizes varied from 1 to 25 pieces.

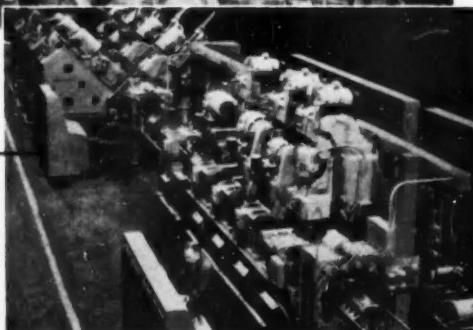
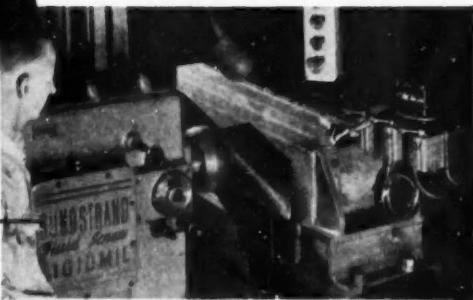
## Multi-Station Automatic Indexing Machine

Here is a Sundstrand Special Four Station Process Machine for milling slots in piston retainers. The part is located and clamped at station #1 and then indexed thru the remaining three stations to complete the machining with one handling of the part. All units are interlocked with the index table for automatic operation at a production rate of 180 pieces per hour.

## Multi-Station Automatic Transfer Rigidmil

Here is an interesting example of Sundstrand "Engineered Production" as applied to interlocking several machine elements into continuous flow production. It is a Sundstrand special purpose 29 station transfer or process type machine designed and built to drill and ream locating holes, mill bearing sides and odd pads on cylinder blocks. Controls are operated from a floor mounted console type control station.

Here are some representative examples of machine tools and services offered by the Machine Tool Division of Sundstrand. Standard basic machine designs and units, coupled with methods engineering assistance, have resulted in many cost-saving Sundstrand installations. If you have metal working operations in your plant and are interested in lowering manufacturing costs, call in a Sundstrand representative. He'll be glad to assist you in obtaining more economical methods. There is no obligation for this service.

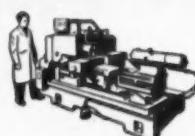


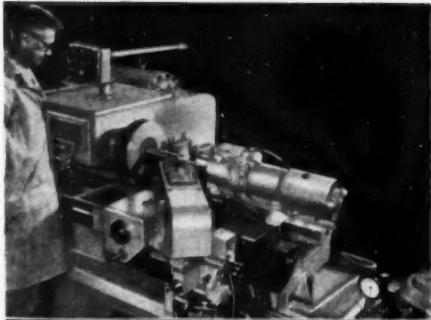
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Production  
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AUTOMATIC LATHES

SIMPLEX RIGIDMILS

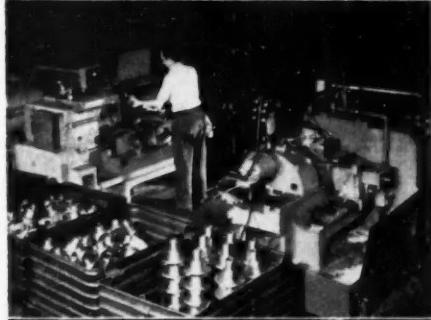
DUPLEX RIGIDMILS





### Tracer Turning

For multi-cycle single point turning of irregular shapes, Sundstrand Automatic Lathes can be provided with a template controlled tracing slide mounted to the regular front carriage. With this attachment and controls, ruff, semi-finish and finish cuts can be taken with one turning tool in an automatic cycle. The regular rear slide can be used to square up shoulders, chamfer, etc.



### Small Lot Turning With Multiple Tooling

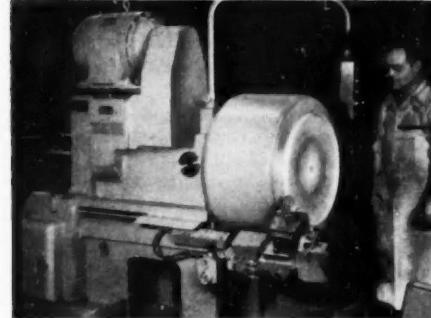
Illustrated at left are two Sundstrand Automatic Lathes used for turning various sizes of yoke parts in lot sizes of 500 or less. Production was increased more than 5 times compared to the former method. Changeover time is 25% less than with former equipment.



### Hopper Loading For Production Turning

This Sundstrand Model 8A Automatic Lathe turns and chamfers three different lengths and diameters of master track link pins. Operator loads parts into a hopper loader and automatic machine cycle is started with chucking of part.

When machine cycle is completed, a work ejector pushes the pins out of the chuck and into the unloading vee. Machine will run automatically with one filling of the hopper for approximately 10 minutes.



### Special Turning

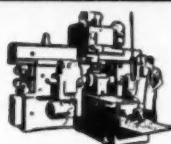
The Sundstrand special short bed lathe illustrated at the left is used for turning and facing the open end of a washing machine tub. The short bed permits easy end loading and unloading to maintain a production of approximately 85 pieces per hour.

#### FREE DATA

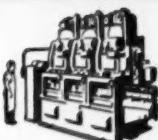
Additional information on the complete line of Sundstrand machines is available. Ask for bulletin S.P. 250.



TRIPLEX RIGIDMILS



SPECIAL MACHINES



**SUNDSTRAND**  
**Machine Tool Co.**

2571 Eleventh St. • Rockford, Ill., U.S.A.

## Future Designs As Foreseen By Body Engineers

(Continued from page 67)

booth. It is the Cobra windshield wiper, capable of wiping around the corner. A similar result, obtained by a different design method, was demonstrated by Trico with its Cam-O-Matic windshield wiper system.

L-O-F showed its E-Z-I three-way rear mirror with built-in shift, considered it the answer to headlight glare in night driving.

On opening day DuPont put on a stage presentation featuring DuPont's fiber family by means of mannequins demonstrating synthetic fibers for automotive and personal use.

Color treatment, inside and out, given such exceptional attention by all producers this year, was discussed by Miss Pieti, Chrysler Corp.; and Gene Bordinat, Lincoln-Mercury.

"What is proved at the proving grounds" served as the springboard for a paper by L. H. Frailing, Packard Motor Car Co.

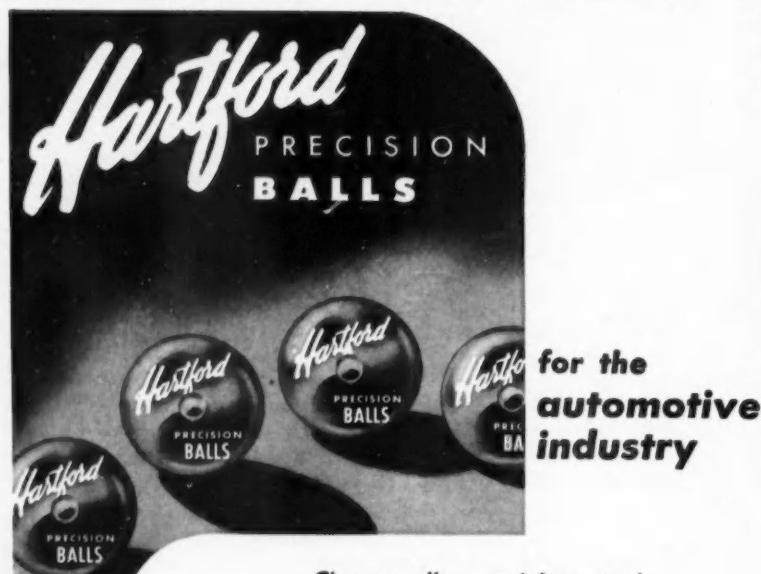
There is considerable misunderstanding of the problems of safety and much has been said even recently about the protection of the occupants of a motor car in the event of collision. One of the important contributions at this meeting was the report by Dale K. Pettry, Ford Motor Co., dealing with a survey of the problem—a search of the literature and other sources. It covers such items as seat belts, instrument panel, information on skull fractures, etc. The author concludes that some of the things under study show promise and should be incorporated in future product design.

New materials for product construction as well as for tooling, models, fixtures, etc., were covered in detail in an important group of papers. A further report on the characteristics and production problems of Fiberglas bodies for the Corvette was presented by John G. Coffin, Chevrolet engineering. Silicone finishes for upholstery fabrics were covered in detail by Dr. Bass and R. A. Ford, Dow-Corning Corp. Silicone finishes are being incorporated in upholstery materials and convertible top fabrics, providing outstanding protection against effects of weather and dirt, and increasing durability materially.

An extensive report on the use of plastic formulations in the production of plastic models of parts and bodies, as well as tools and fixtures, was given by R. D. Beck, Fisher Body. He pointed out that although over 100 basic types of synthetic resins are available for this purpose, the majority of plastic tools made today are of just two types—the epoxies and the polyesters.

The now well-known Rezolin plastic formulations for tools, fixtures, and sheet metal dies were described by George C. Adams, Rezolin, Inc., with comments on some of the more recent developments available for the motor car field.

U. S. Gypsum distributed at its booth a comprehensive brochure outlining the special types of plaster formulations for patterns and tools. It announced a new material—Salvad "A" parting compound to facilitate removal of epoxy laminating and casting resins.



Chrome alloy, stainless steel, bronze, Monel, K. Monel, aluminum, copper, glass, plastic, drilled balls...Hartford makes them all, and is thoroughly experienced in supplying the automotive industry. Your specifications will receive prompt attention in our Engineering Department.

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WICHITA 1, KAN. A. E. WERNER OPHEUM BLDG.	KANSAS CITY 8, MO. T. B. WHITE 1919 BALTIMORE AVE.	LOS ANGELES 15 E. D. MALTBY CO. 1718 SOUTH FLOWER ST.	EXPORT OFFICE R. A. RODRIGUEZ, INC. 55 W. 42nd ST., NEW YORK 18

TH654



**NEW...**

**YOUNG offers**

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**TORQUE CONVERTER**

**COOLERS**

... for mobile and stationary applications up to 600 hp. Applications above 600 hp. to special design

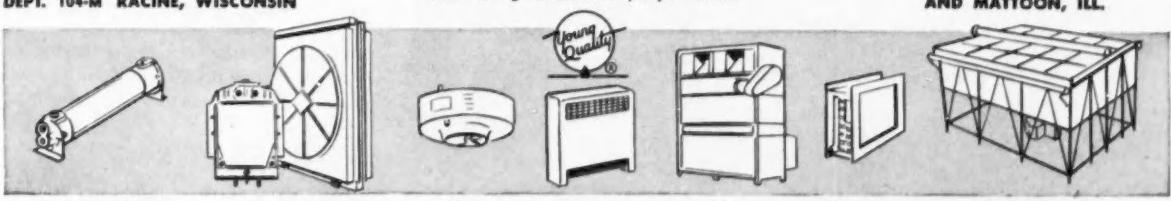
Now Young supplies industry the first catalog ever issued on a complete stock line of Torque Converter Coolers. These coolers are engineered for any *mobile* or *stationary* application from 50 to 600 hp . . . for oil-to-air or oil-to-water cooling. Young air cooled mobile oil Coolers are designed for 150 and 300 hp engines. *Stationary* type oil-to-air Coolers are available in 4 models; OCS 175, 300, 450 and 600 for engines from 100 HP up. Also, 11 standard water-cooled shell and tube type Coolers are built for *mobile* or *stationary* application. Shipment from stock makes possible quick delivery at lower unit cost. For further details see your nearest Young Representative.

Heat Transfer Products for Automotive, Agricultural, Industrial, Gas and Diesel Engine Application.

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Other Young Radiator Company Products:



Send today for the FREE new Young Torque Converter Cooler Catalog No. 1054. It contains product features and illustrations, dimension and performance data on the entire Young Line.

Heating, Cooling, Air Conditioning Products for Home and Industry.

PLANTS AT RACINE, WIS.  
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**THERE'S  
NO PLACE FOR  
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**...IN BUYING  
*precision  
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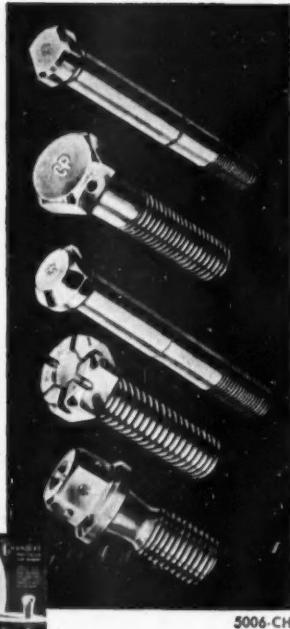
That's why Chandler specialists invite rigid inspection. The Blindfold is "off" during production of fasteners to your specifications . . . and you can rely on Chandler.

Specialists in bolts from high alloy steels . . . with special heads or threads . . . with drilled heads or shanks . . . ground to close tolerances . . . and with threads rolled after heat treating.

Write today for Bulletin 1264-CH



1492 CHARDON ROAD • CLEVELAND 17, OHIO



## AGMA Meeting

(Continued from page 55)

more easily interpreted than helicals, worms, bevels and other tooth forms, but the method is applicable to every gear. The number of check-points required increases not only with the complexity of the part but also with the degree of deviation of the actual part from perfect. In other words, it is easy to ascertain by a few measurements and with a high probability factor that a perfect part is perfect, but it may take many times more measurements to ascertain whether a not-perfect part is still within tolerance or not. In checking for inspection and quality control the maker should not be satisfied with merely deciding that a certain gear has passed inspection; the producer should be even more concerned with the question of whether a gear was perhaps rejected, not because it was wrong, but because it was improperly measured. Finally, he wants to know in detail what was wrong with the rejected gear and how the data can be interpreted to make the necessary corrections.

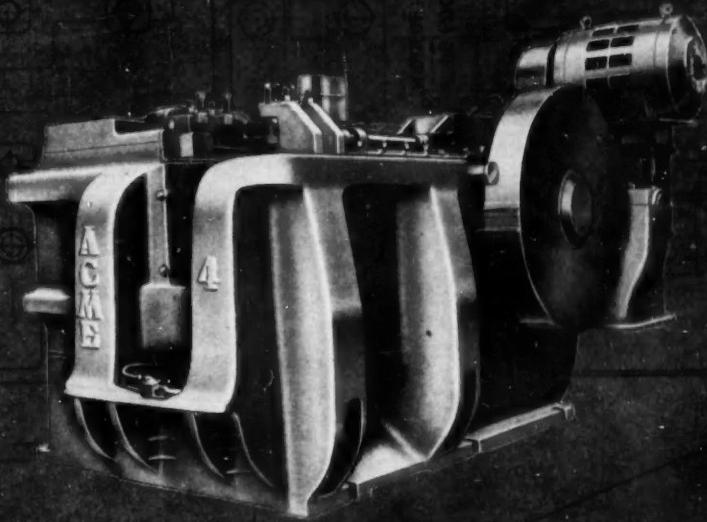
Fig. 3 shows in a diagrammatic way the gear tooth under measure-

**TABLE I**  
**Approximate Range of Gleason  
Unitool Cutters**

Cutter Diameter inches	Cone Diameter inches	Face Width inches	Diametral Pitch
3.5	1.3 - 2.4	0.4 - 0.8	6 - 16
4.5	1.7 - 3.0	0.5 - 0.9	6 - 13
6.0	2.2 - 3.8	0.7 - 1.2	6 - 10
7.5	3.0 - 4.5	0.8 - 1.4	4 - 8
9.0	3.8 - 5.8	1.0 - 1.7	3.5 - 7
12.0	4.5 - 8.0	1.2 - 2.2	2.5 - 5

ment and the position of four point-probes. The figure also shows a number of recording, black round dots on the chart. In order for the gear to index, the probes are lifted and brought down for the next tooth. For measurement, the probes move forward in the direction of the arrows and the recordings on the chart are made simultaneously by styli, not shown in the diagram, moving in the same direction as the probes. The nominal dimensions are represented by two heavy reference lines; the actual dimensions, by the deviations of the dots from the reference lines. Each tooth in Fig. 3 is measured at four points on the pitch line, two measurements to each flank. For a perfect tooth the marks would fall on

# PROVEN FORGING MACHINE



**A**CME XN 4" upset forging machine with the most powerful grip ever built into ANY forging machine. Plus additional Nitroloy liners for even greater product accuracy. Other improvements insure Higher Output, Lower Maintenance, and Longer life.



The whole story is told in this new catalog of the complete line of ACME XN Forging Machines showing all models with specifications and details of construction PLUS fifteen illustrated technical articles explaining in detail some of the modern methods of upset forging on unusual pieces.

*It's Yours For The Asking!*

## THE HILL ACME COMPANY

ACME MACHINERY DIVISION • 1209 W. 65th St., Cleveland 2, Ohio  
ESTABLISHED 1892

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING AND POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

# HORSEPOWER

... a size and type  
for every need

Whether it's repowering old equipment or buying new — too much or too little horsepower can prove costly. Equally as important as proper horsepower, is correct engineering of the application. Quite often, it is necessary that engine accessories be mounted in accordance with requirements of the equipment. It usually takes a right size and right design to supply the specific power needs for each type of machinery.

The engineering and sales policy of Hercules Motors Corporation is to design and sell internal combustion engines to fulfill the specific needs of each customer. For example, in equipment with limited engine installation area, "flat" or horizontal engines are often the answer. These engines can be placed under floors, or in any area which does not permit vertical installation. (Consult factory for models available.) Special Hercules vertical engines with accessories located on one side, permit installations near a firewall or bulkhead which is permanent and does not allow access to one side of the engine. These are but a few of the many problems which are often encountered in the proper application of an engine.

Our basic line of Hercules engines, 70 models from 3 to 500 H.P., is designed and engineered to meet the exact and varying demands of industry. We build engines for operation on gasoline, diesel fuel, natural gas, L. P. Gas, kerosene, or any other standard fuel that is readily available. That's why we have been known as "Engine Manufacturing Specialists Since 1915"

If you'd like to know more about our engines, write for the folder "Hercules Engines". It lists the sizes and power ratings of each model. If, however, you have a specific power problem give us the details. Our engineers will work with you to solve your problems and of course, there is no obligation.

*Engine Specialists since 1915*



## HERCULES ENGINES

HERCULES MOTORS CORPORATION

103 Eleventh Street, S. E. • Canton, Ohio



the two reference lines. Deviations of the recorded points from these lines are indications of error in the position or shape of the tooth flank at the measuring points.

## New Sealed Beam Lamps

(Continued from page 61)

aiming of the new headlamp, coupled with the new filament cap, is said to be particularly helpful in giving greater visibility through rain or fog. The cap, together with the greater direction of light to the right-hand side of the road, also helps to cut down glare for approaching drivers.

States' approval for sale and use of the new headlamp has been obtained from all states except: Kansas, Missouri, Washington, and West Virginia. These states expect to complete vehicle code changes allowing the new lamp's sale and use when their legislatures convene in January, 1955.

Until changes have been made in the vehicle codes of the following states, it will be necessary to aim the lamps three inches down at 25 ft instead of two inches down as will ultimately be the case: Alabama, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Idaho, Indiana, Iowa, Minnesota, Nevada, New Mexico, Oregon, Pennsylvania, South Carolina, Texas, and Utah.

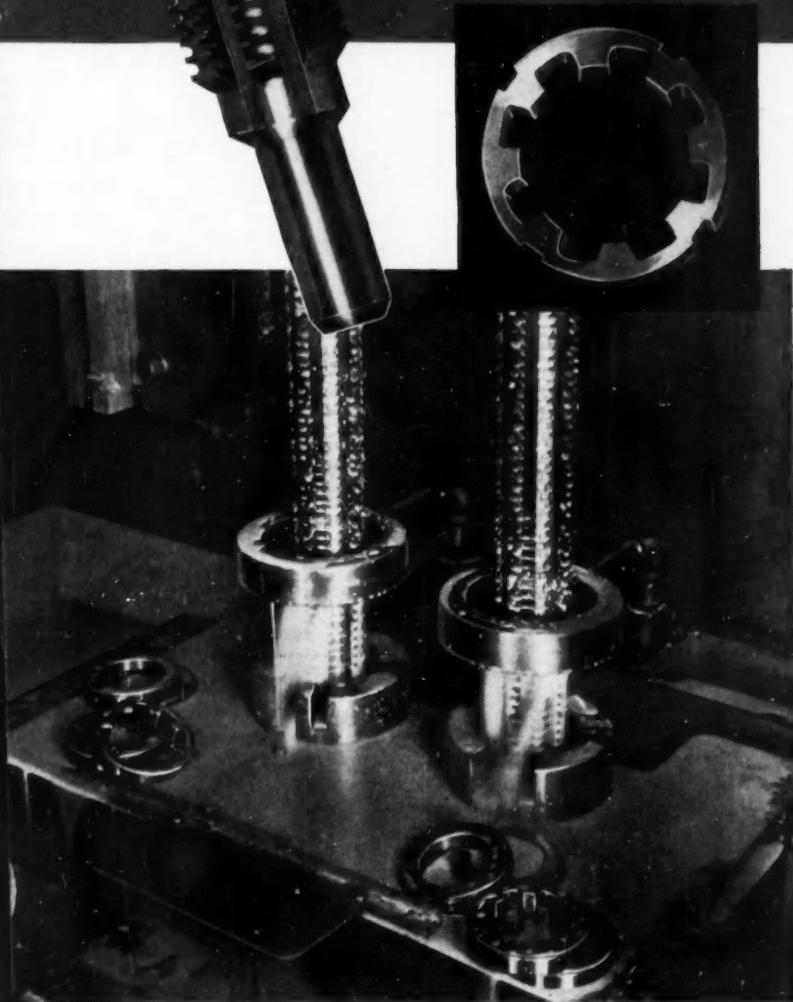
Essentially, the automobile industry's plans are to introduce this lamp into automobile production when legislative details have been clarified in the few states involved.

Already, three of the companies which cooperated in development of the new headlamps — Westinghouse Electric Corp., Tung-Sol Electric, Inc., and General Electric Corp.—have announced availability of the units.

## BOOKS ...

INSTRUMENTATION, published by Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Price, \$2.00. This volume lists 775 Government-owned inventions in the field of instrumentation, with a brief description of each invention. In addition to the brief description or abstract of the invention, each listing includes the patent number, the title of the invention, the name of the inventor, and the Government agency administering the patent. The listings are classified under eight subgroups to help readers quickly locate items of particular interest. Also listed in the book are the addresses of the field offices of the Dept. of Commerce and of the Small Business Administration, which may be consulted concerning the availability and use of these inventions.

# More Production, More Profit BY BROACHING . . .



Internal broaching of a cam ring. The spline form has unsymmetrical sides and cam form on the major diameter. The steel is soft and tends to tear, yet this Continental Broach sizes the I.D. and cuts 8 splines  $5/16"$  deep in one pass.

**REMOVE STOCK TO  
PRECISION LIMITS  
FAST . . . ROUGH  
AND FINISH  
IN ONE PASS!**

The scope of Broaching has broadened in recent years. Many broaching operations do precision work in far less time than other metal-cutting methods.

Continental Engineers have for years been designing all types of cutting tools, broaches and broaching fixtures. They can recommend the most economical way to do your work.

For facts about increasing your production by broaching, call in your local Ex-Cell-O representative—or write Continental in Detroit for Cutting Tool Catalog.

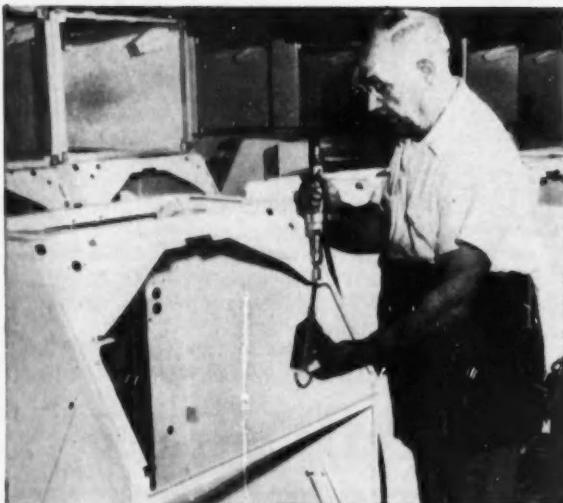
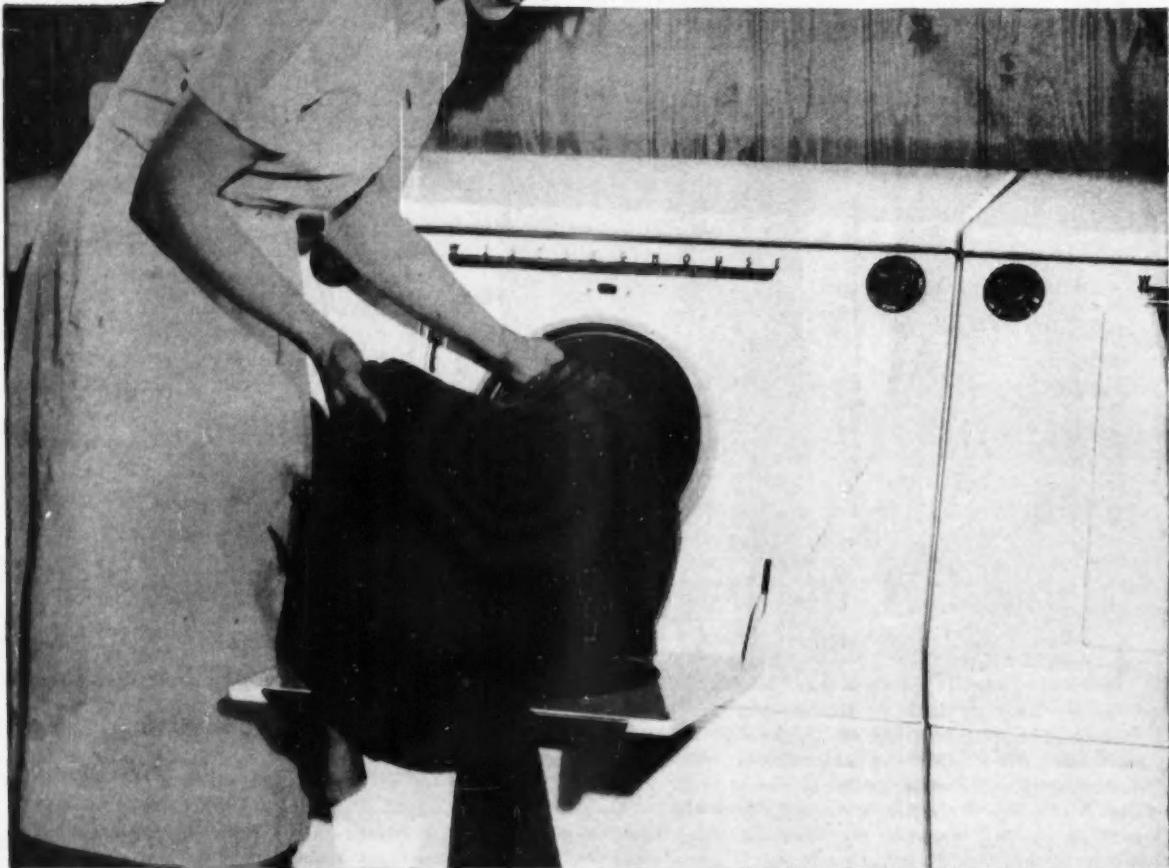
Continental  
TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION  
DETROIT 32, MICHIGAN

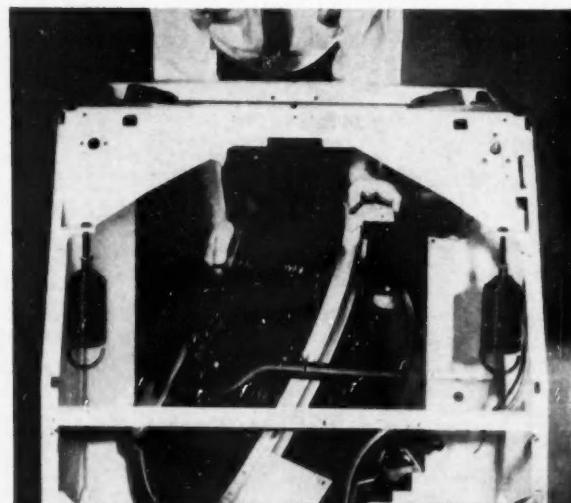


# Over 1,000,000

OVER A MILLION families wash their clothes in Laundromats. Westinghouse also does a big export business, so these machines have to be trouble-free.



HERE, a man installs the main suspension springs. The springs are periodically tested to meet severe 450 c.p.m./ $\frac{1}{8}$ -inch amplitude, vibration tests.



AS UNIT IS INSTALLED in shell, man holds top damper spring. Notice damping blocks on end of flat spring to reduce excess movement.

# Laundromats in use, but...

## "We've never had a failure with American Quality Springs"

says **WESTINGHOUSE ELECTRIC CORPORATION**

THE Westinghouse Laundromat has been a household word ever since the first unit rolled off the production line in 1940. Since then, Westinghouse has produced over 1,125,000 Laundromats. Despite many important improvements, the superb spring suspension system has stood the test of time. It's the same today as it was in 1940, because it was designed so well in the first place.

Three different styles of American Quality Springs are used in the Laundromat. The *coil* springs support the entire weight of the machine within its shell. The *flat* steel springs contain friction dampers that limit excessive

movement caused by an unbalanced load during the spin-dry cycle.

Failure of a coil spring could damage the entire machine. At the least, it would mean an expensive service call. But, because of the efficient design, and the completely reliable American Quality Springs, *no spring has ever failed in a Westinghouse Laundromat*.

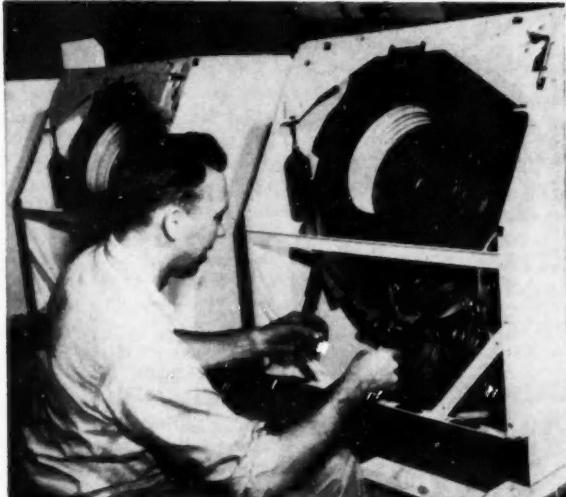
If service like this makes sense to you, get in touch with your nearest American Steel & Wire representative. We make all kinds of springs, any steel, any finish. And you'll get the same kind of quality that Westinghouse gets.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION, GENERAL OFFICES: CLEVELAND, OHIO  
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS  
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## U·S·S American Quality Springs

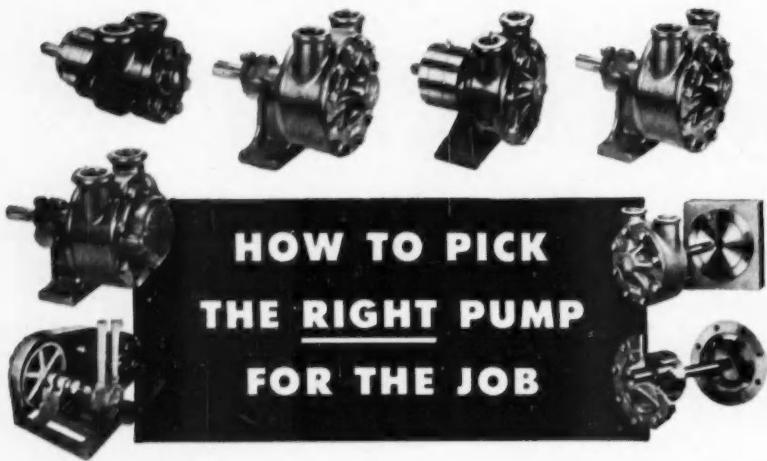
UNITED STATES STEEL



BOTTOM DAMPER springs are installed. Because of the entire engineered suspension, Laundromat was one of the first washers that didn't have to be bolted to floor.



WESTINGHOUSE LAYS DOWN rigid specifications for their American Quality Springs, proving their motto, "Quality must be built into a product."



## HOW TO PICK THE RIGHT PUMP FOR THE JOB

### TUTHILL Simplifies Pump Selection for PRODUCT DESIGNERS

To make it easy for product designers to select the right oil pump for the job, Tuthill offers new catalog data covering pump models to meet the specific pumping purposes outlined below. Each

catalog features an individual pump guide so you can select the exact pump to fit your need. Check the following services and ask for the Tuthill catalogs you wish by Catalog number indicated.

#### For PRESSURE LUBRICATION

	Catalog No.	
Model L	1/2 to 6 g.p.m. up to 200 p.s.i.....	101
Model C	2 to 200 g.p.m. up to 100 p.s.i.....	102
Model R	1/2 to 200 g.p.m. up to 100 p.s.i.....	105
Models S & SA	1/2 to 200 g.p.m. up to 200 p.s.i.....	106

#### For HYDRAULIC SERVICE

	Catalog No.	
Model L	1/2 to 6 g.p.m. up to 600 p.s.i.....	101
Model CK	5 to 200 g.p.m. up to 400 p.s.i.....	103
Model R	1/2 to 200 g.p.m. up to 400 p.s.i.....	105
Models S & SA	1/2 to 200 g.p.m. up to 200 p.s.i.....	106

#### For COOLANT SERVICE

	Catalog No.	
Model C	2 to 200 g.p.m. up to 100 p.s.i.....	102
Model CK	100 to 200 g.p.m. up to 200 p.s.i.....	103
Model M	2 to 50 g.p.m. up to 15 p.s.i.....	104
Model R	2 to 200 g.p.m. up to 100 p.s.i.....	105
Models S & SA	2 to 200 g.p.m. up to 200 p.s.i.....	106

#### For TRANSFER AND CIRCULATING

	Catalog No.	
Model L	1/2 to 6 g.p.m. up to 200 p.s.i.....	101
Model C	2 to 200 g.p.m. up to 100 p.s.i.....	102
Model CK	100 to 200 g.p.m. up to 200 p.s.i.....	103
Model R	2 to 200 g.p.m. up to 100 p.s.i.....	105
Models S & SA	2 to 200 g.p.m. up to 100 p.s.i.....	106

#### For BURNING OILS

	Catalog No.	
Model L	1/2 to 6 g.p.m. up to 200 p.s.i.....	101
Model C	2 to 50 g.p.m. up to 100 p.s.i.....	102
Type SU	2 to 50 g.p.m. up to 300 p.s.i.....	107

#### For BUILT-IN APPLICATIONS

All standard Tuthill Pump models are available in stripped form for building into the design of your equipment. Ask for Catalog No. 106.

### TUTHILL PUMP COMPANY

Dependable Rotary Pumps since 1927

939 East 95th Street, Chicago 19, Illinois

Canadian Affiliate: Ingersoll Machine & Tool Co., Ltd.

Ingersoll, Ontario, Canada.



## Engine Designers Concentrate on Torque

(Continued from page 92)

Ford engineering took a forward step a few years back by eliminating the removable valve guides. Instead, the valve stems operate in holes bored in the parent metal of the head. By thus increasing heat transfer, Ford found that valve stem and valve head temperatures were reduced. Not only was valve life increased but engine efficiency was improved and heat rejection materially decreased. This year some of the other manufacturers have shifted to this type of construction.

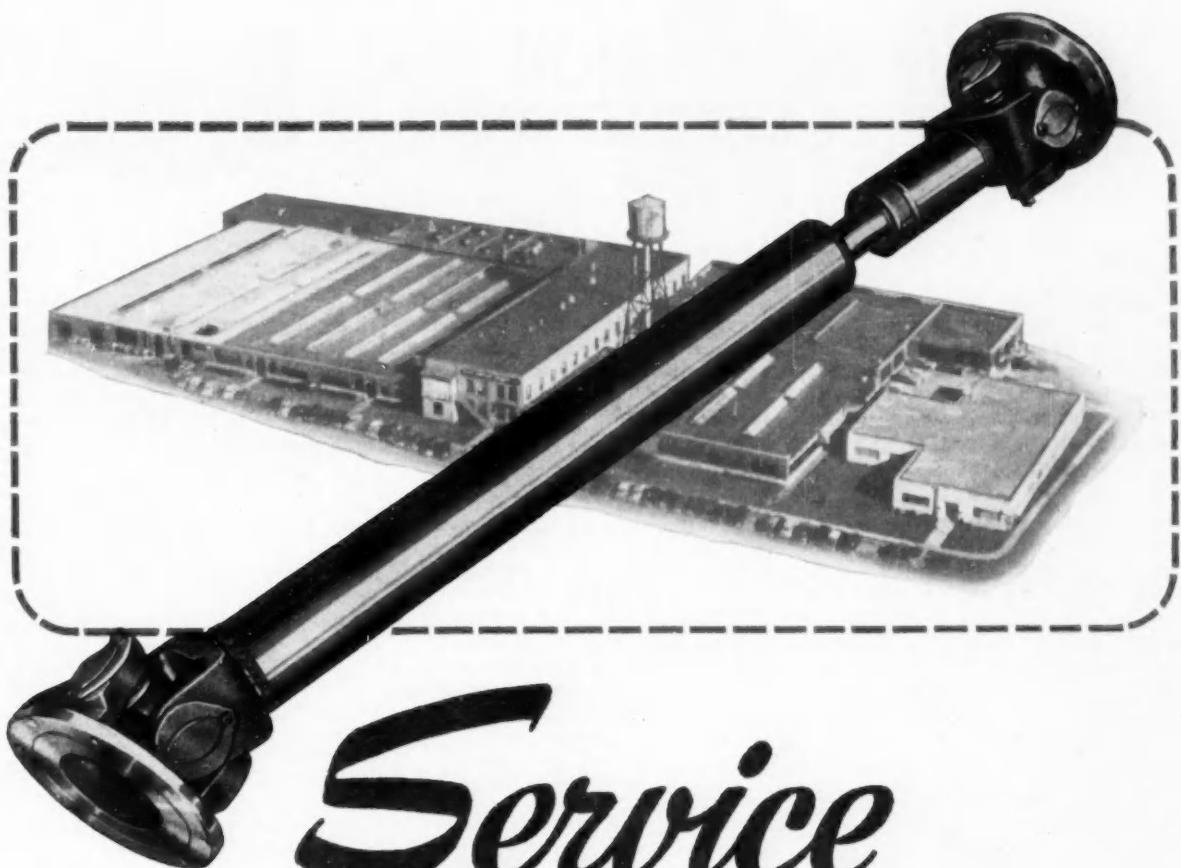
Another important characteristic of the new crop of V-8's that deserves repetition is short stroke—in fact, bore-stroke ratio is greater than unity on most engines, stroke being less than bore diameter in most instances. Apart from resulting in extremely compact engines, this factor is responsible for a reduction in friction horsepower, contributing proportionately to improved mechanical efficiency.

#### Basic Problem Remains

There still remains a basic problem common to all makes of engines. What is the horsepower of engines as installed in cars and equipped with all accessories? Traditionally, however, each engine builder has his own test code and rates his engines accordingly. So long as there is no uniform code used by all, there will be confusion as to ratings. In fact, it seems commonplace for one manufacturer to apply his test code to a competitor's engine and find a discrepancy in the rating. If he uses a conservative method of rating his engine will suffer in its advertising message to car owners.

Many engineers now believe it desirable to adopt a uniform code of engine testing—perhaps the present SAE code or a modification of it. The problem goes deeper than the code. What is a bare engine; what constitutes maximum horsepower; what is real horsepower?

What we are getting at is this: regardless of paper horsepower, the only thing that counts is how much torque is available at the rear wheels. And regardless of advertised ratings, car owners will rate performance by what the car will do on the road and in the clutch when extra acceleration is imperative.



# Service

**is an Attitude . . .**

At Blood Brothers, Service is the "attitude of the day"—every day. As manufacturers of propeller shafts for heavy-duty automotive use, Blood Brothers believes that willing, helpful cooperation is the key to improved performance, better products and greater customer satisfaction.

At times, your model changes necessitate altered specifications . . . or technical problems require expert advice . . . or you are called by customers who want replacement parts.

At such times, we're confident you'll find Blood Brothers alert, willing and able to solve universal joint and propeller shaft problems — for *sure!*



**UNIVERSAL JOINTS  
AND DRIVE LINE ASSEMBLIES**

**BLOOD BROTHERS machine division**

Rockwell Spring and Axle Company

**ALLEGAN, MICHIGAN**

# ON OUR WASHINGTON WIRE



Defense Dept. is getting ready to begin buying machine tools with funds from the \$100 million Congress voted for that purpose. First tool orders, however, will not go out until late December or early January.

More than 650 Government-owned patents dealing with metal processes and machinery are described in a new government publication, "Metal Processes and Apparatus, Machinery, and Transportation Equipment." Copies are available at \$2 each from Office of Technical Services, U.S. Commerce Dept., Washington 5, D.C.

The wave of business mergers of recent months may be about over. Federal Trade Commission seems determined to slow the trend down to a walk. Many of the 200-plus mergers now being studied by the FTC could be stymied.

Government technicians are now studying a new low-tension ignition system for naval engine use. It is said to provide economy of construction and maintenance; slower idling and higher top speeds; lower weight and space requirements, and to be capable of using lighter cables and insulators.

Air Force will build a \$10 million research and development laboratory for Pratt and Whitney Aircraft Div. of the United Aircraft Corp. It will be used in designing a nuclear-powered aircraft engine.

Tighter employment conditions and reduced corporate earnings this year dropped industrial strikes to a new post-war low for the first nine months of 1954, Labor Dept. reports.

Some automobile-producing firms may be among the businesses which stand to benefit from an estimated refund of \$400 million on their Federal income tax payments. Those companies eligible for refunds are the ones which lost money recently.

Companies doing business abroad now have available to them a broad new series of Government reports called "World Trade Information Service." For subscription rates, write Bureau of Foreign Commerce, U.S. Dept. of Commerce, Washington 25, D.C.

Working capital of domestic corporations increased by \$1.2 billion during the second quarter of this year to hit a record \$94.1 billion, Securities and Exchange Commission reports. Major factor in the improved position was a \$3.2 billion drop in federal income tax liabilities.

Naval Research Laboratory chemists have developed a simplified laboratory tool for studying the effects of rust inhibitors or detergent additives on the flow of lubricating oils, particularly at low temperatures. Known as a three-level capillary viscometer, it provides a sealed system in which repeated measurements can be made in an inert atmosphere.

**Special cold headed products**

...nails • rivets • screws  
...made to order

...and to your specifications  
in any metal. Large raw  
material inventory for your  
convenience. Send drawing  
— advise quantity.  
Free catalog on request.

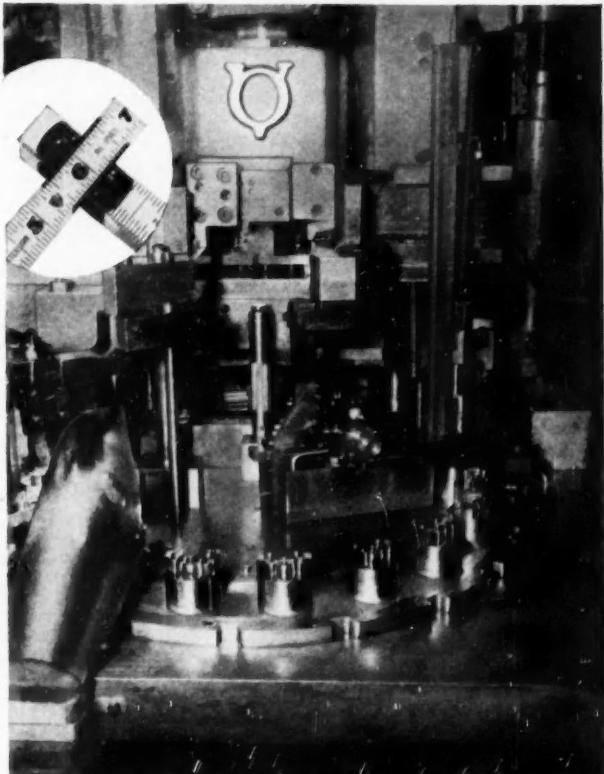
**Hassall**  
ESTABLISHED 1850

**JOHN HASSALL INC.**  
P. O. Box 2194, Westbury, Long Island, New York

In continuous cycles the V & O #50S Press with dial feed turns out 20,000 complete clamp assemblies for folding wood rules in the regular working day. From right to left—the spring is stripped from a magazine, the female and male clamp halves are formed, an eyelet inserted and expanded, and the complete assembly delivered to a hopper.



## AUTOMATED V&O PRESS BOOSTS MAN-HOUR PRODUCTION 2000%



The 18 station dial feed on the V & O #50S Press at the Master Rule Mfg. Co. has supplanted 13 smaller presses and more than tripled total daily production. So accurate is the alignment of the press that the dies are removed for sharpening only after each five-millionth piece. Production per man-hour is up over 2000 per cent.

Fourteen men and fourteen machines, working an overtime schedule, previously produced 6,000 clamps for wood folding rules a day at Master Rule Mfg. Co., Middletown, N. Y. Now, one of the original presses, a V & O No. 0, makes the stainless steel springs. A V & O No. 50S with dial feed and two progressive dies has taken the place of the other thirteen machines for producing the clamp halves and completing assembly. Present production, with two machines and two operators, is in excess of 20,000 clamps for a 7½ hour day.

V & O has been designing and building precision power presses since 1889. Because they are built like precision machine tools you can safely use the clever and expensive tooling required for automation. With automated V & O presses you can depend on higher precision production and you can count on lowered unit costs.

Our representatives will be glad to show you how V & O automation can make your operations more productive and more profitable.

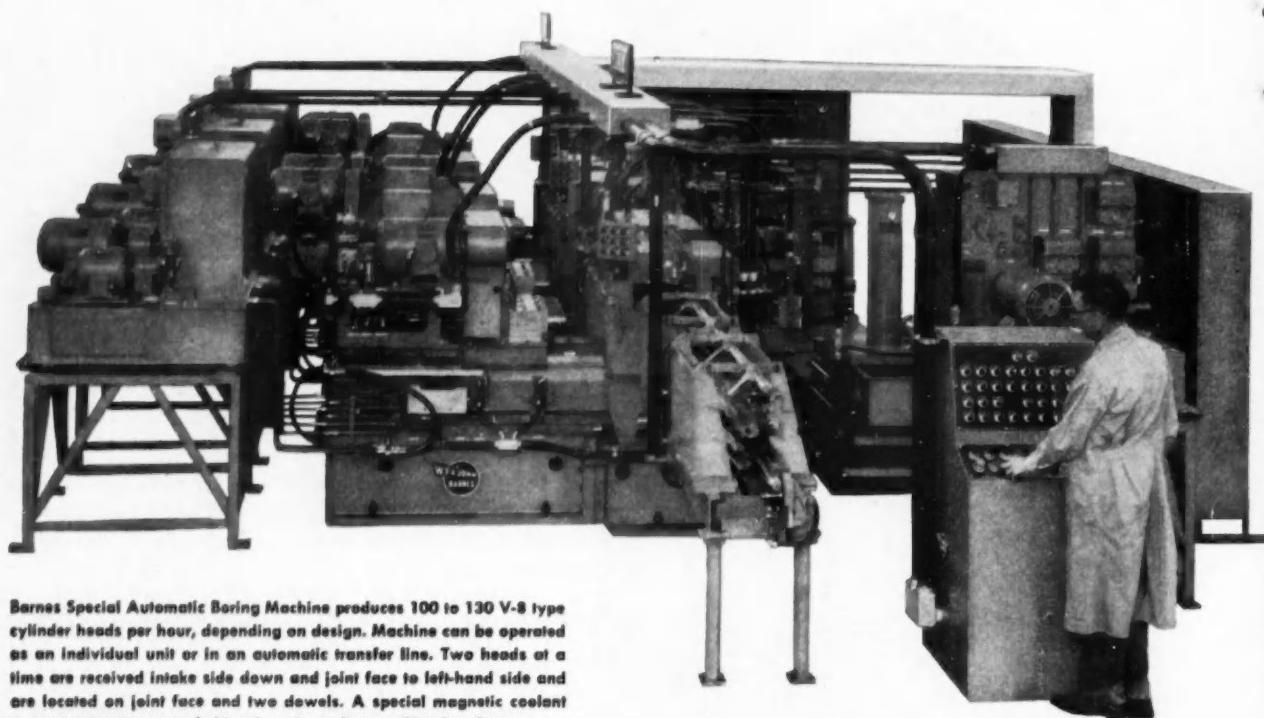
**THE V&O PRESS COMPANY**  
DIVISION OF EMHART MFG. CO.  
**HUDSON, NEW YORK**

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889



***Only the best is good enough***

# Announcing NEW MACHINING AUTOMOTIVE



Barnes Special Automatic Boring Machine produces 100 to 130 V-8 type cylinder heads per hour, depending on design. Machine can be operated as an individual unit or in an automatic transfer line. Two heads at a time are received intake side down and joint face to left-hand side and are located on joint face and two dowels. A special magnetic coolant separator removes metal chips, insuring a fine machined surface.

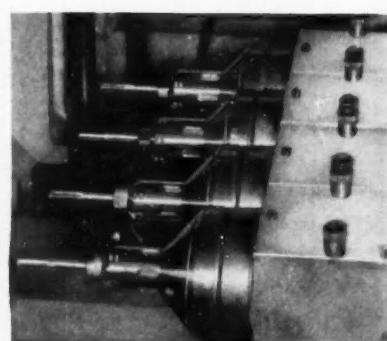
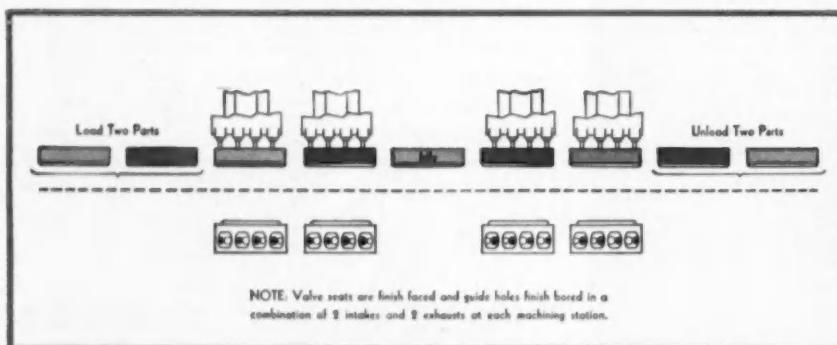


Diagram above illustrates how heads are transferred two at a time and machining operations arranged to meet high output requirements. For lower production, machines are designed with fewer machining stations and one-station transfer unit.

Closeup of 4-spindle head with special tools for machining four valve seats and stem holes in one pass. Second 4-spindle head completes remaining operations.

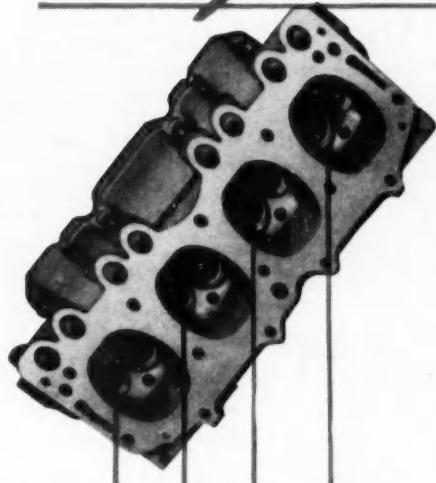


**Builders of Better Machines Since 1872**

MULTIPLE SPINDLE DRILLING • BORING • TAPPING

# PRECISION METHOD OF FINISH VALVE SEATS AND STEM HOLES

## *Automatically*



Cylinder head for V-8 engine showing finish machined valve seats and guide holes. Red arrows indicate operations performed at first machining station.

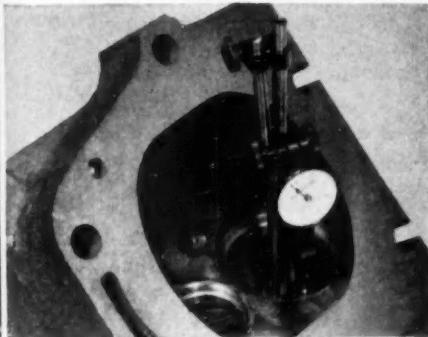
### EXCLUSIVE W. F. & JOHN BARNES MACHINING DEVELOPMENT HOLDS TOTAL CONCENTRICITY WITHIN .0005"

Now, a new precision machining method developed exclusively by W. F. & John Barnes makes it possible for you to finish machine automotive valve seats and stem holes on a continuous automatic basis. You can now eliminate corrective operations after normal boring, reaming, and seating operations, because this new development holds total concentricity within .0005" (total indicator reading). This new machining process, as incorporated into Barnes Automatic Progress-Thru Type Machines, consists of multi-blade tooling for the valve seating operations, combined with modified gundrilling tools for precision boring valve guide holes. Production tests show the valve seat tools produce 10,000 to 15,000 parts, and the boring tools, between 2,500 and 4,000, before regrinding or replacement is necessary. The net result has increased production efficiency and improved product quality at lower cost. Write for more facts today.

### TO SAVE TIME INVESTIGATE BARNES' 6-POINT MACHINE TOOL BUILDING SERVICE

For over 75 years, Barnes has designed and built special machinery. These years of experience can assist you in saving time and cutting costs. Check

the advantages of an engineering and building service from one convenient source.



Concentricity of valve seat and stem hole held to .0005" total indicator reading.

1 **SPECIALIZED MANUFACTURING FACILITIES**—75-year background, large well equipped plant efficiently toolled to build high production machines.

2 **SPECIAL HYDRAULIC EQUIPMENT**—designed and built to meet JIC standards. Individually engineered units assure smooth, dependable actuation for every requirement.

3 **SPECIAL ELECTRICAL EQUIPMENT and CONTROLS**—individually designed and built for maximum safety and ease of control, with circuits that assure the most dependable coordination of all machine functions.

4 **SPECIAL GAUGES, FIXTURES, TOOLS**—designed for each individual machining problem, assure accuracy of operations at high production speeds.

5 **SPECIAL HANDLING AND CONVEYOR EQUIPMENT**—designed and built to reduce work handling, effect maximum safety and efficiency.

6 **COORDINATED DESIGN AND ENGINEERING**—Mechanical, Hydraulic, Electrical, Process, Tool, and Fixture Engineers work together at Barnes. Team-work solves complex problems quickly.

#### WRITE FOR FREE BOOKLET

Ask for free booklet "Coordinated Machine Engineering" describing the scope of Barnes machine tool building service.



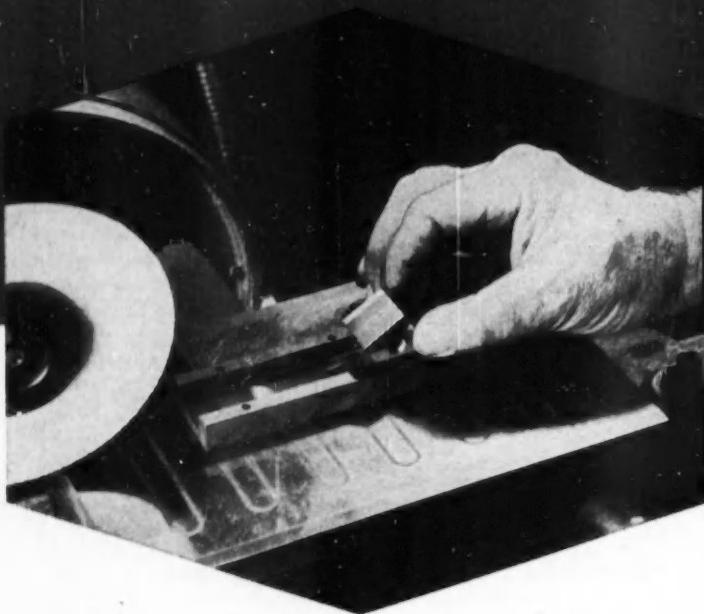
**W. F. & JOHN BARNES COMPANY**  
**312 SOUTH WATER STREET, ROCKFORD, ILLINOIS**

MACHINES • AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES

# ENDURING ACCURACY

UNDER CONSTANT SHOP USE WITH

## PRATT & WHITNEY SOLID CARBIDE PRECISION GAGE BLOCKS



Today's demands for extremely accurate components make high precision measurement **on-the-job** an absolute necessity. Gage blocks have moved out into the shop . . . their use is no longer confined to the Standards Room!

To control **your** precision measurements . . . to avoid frequent and costly gage block replacements, especially where abrasive conditions prevail . . . RELY ON PRATT & WHITNEY SOLID CARBIDE GAGE BLOCKS. Out-wearing steel blocks by many times, they are accurate, they stay accurate . . . and they cost you less in the long run. P&W has supplied industry with Solid Carbide Blocks for more than 4 years. Replacements due to wear have been negligible in this period.

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DIVISION NILES-BEMENT-POND COMPANY

WEST HARTFORD 1, CONNECTICUT, U. S. A.

SINCE 1860

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MACHINE TOOLS • CUTTING TOOLS • GAGES

OFFICE ONLY

## SHORTIES

Three out of 10 deaths on the highways, say safety authorities—and nearly half of all non-fatal accidents—are caused by bad brakes.

The nation's highway users are paying special automotive taxes at a record-breaking rate of \$6 billion annually. Federal automotive excise taxes, alone, are now totaling more than \$2 billion a year.

Eighteen per cent of all U. S. patents issued in 1953 were automotive.

Two-thirds of all U. S. males over 13 years of age are drivers.

Taxes take 28 cents out of every dollar spent to buy automobiles.

More than 9.7 million are employed in highway transport industries of the U. S., or one out of every seven workers.

The U. S. now produces 76 per cent of all the world's motor vehicles and owns 76 per cent of the passenger cars in the world.

There are only 3.1 persons for each motor vehicle in the U. S., compared to 45 in Europe, 76 in Russia and 8745 in China.

Pilots on a single U. S. airline have spent a combined total of more than 7700 years in the air.

The control system on a new guided missile has approximately 1.5 million parts.

A modern fighter plane sucks 132,000 cubic feet of air into its turbines every minute of flight. That's enough air to keep the average human being alive for nearly four months.

# CALENDAR

OF COMING SHOWS AND MEETINGS

First Annual Auto Trim Trade Show, Hotel McAlpin, New York, N. Y. .... Dec. 5-7

National Standard Parts Association, annual convention, Sherman Hotel, Chicago, Ill. .... Dec. 6-7

Society of the Plastics Industry, fifth Film, Sheet, and Coated Fabrics Div. conference, Hotel Commodore, New York, N. Y., Dec. 7-8

Automotive Service Industries Show, Navy Pier, Chicago, Ill. .... Dec. 8-10

## 1955

Chicago Automobile Show, Chicago, Ill. .... Jan. 8-16

SAE Golden Anniversary Annual Meeting and Engineering Display, Sheraton - Cadillac and Statler Hotels, Detroit, Mich., Jan. 10-14

Forty-Fifth Annual National Motor Boat Show, Kingsbridge Armory, New York, N. Y. .... Jan. 14-23

Plant Maintenance & Engineering Show, International Amphitheatre, Chicago, Ill. .... Jan. 24-27

National Automobile Dealers Association, annual convention, Conrad Hilton Hotel, Chicago, Ill., Jan. 29-Feb. 2

Detroit Automobile Show, Detroit, Mich. .... Jan. 29-Feb. 6

Automotive Accessories Manufacturers of America, annual exposition, Navy Pier, Chicago, Ill. .... Feb. 7-11

Society of the Plastics Industry, 10th annual Reinforced Plastics Div. conference, Hotel Statler, Los Angeles, Calif. .... Feb. 8-10

Universal Travel & Auto Sports Show, Madison Square Garden, New York, N. Y. .... Feb. 20-27

Society of the Plastics Industry of Canada, 13th annual conference, Hotel London, London, Ont., Feb. 22-23

Pacific Automotive Show, Pan-Pacific Auditorium, Los Angeles, Calif. .... Feb. 24-27

SAE Golden Anniversary Passenger Car, Body, and Materials Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. .... March 1-3

National Association of Corrosion Engineers, 11th annual conference and exhibition, Palmer House, Chicago, Ill. .... March 7-11

SAE Golden Anniversary Production Meeting and Forum, Netherland Plaza Hotel, Cincinnati, O. .... March 14-16

ASTE Western Industrial Exposition, Shrine Auditorium and Exposition Hall, Los Angeles, Calif. .... March 14-18

Ninth Western Metal Congress and Exposition, Pan-Pacific Auditorium, Los Angeles, Calif., March 28-April 1

National Fluid Power Association, annual spring meeting, Colorado Springs, Colo. .... April 5-7

American Society of Lubrication Engineers, annual meeting and exhibit, Hotel Sherman, Chicago, Ill. .... April 13-15

*For Higher Standards of Precision Measurement..*

A COMPLETE

# GAGE BLOCK SERVICE

# PRATT & WHITNEY

including...

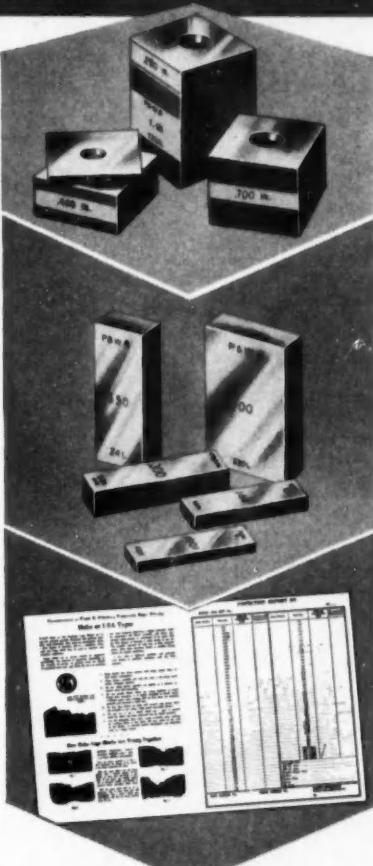
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Single Blocks or Complete Sets.

**Solid Carbide** in sizes from .050" to 4".

**Steel** in sizes from .010" to 20".

Laboratory, Standard or Shop Tolerances.



## USA BLOCKS

Single Blocks or Complete Sets.

**Solid Carbide** in sizes from .050" to 4".

**Steel** in sizes from .050" to 4".

Standard or Shop Tolerances.

## RE-INSPECTION SERVICE

To help you maintain higher standards of basic measurement, P&W offers a complete re-inspection service for your gage blocks (regardless of make). Blocks are carefully cleaned; burs or bruises are removed; size, flatness and parallelism are critically checked; and a complete certified report as illustrated is submitted.

Whether you're looking for finer, more dependable precision gage blocks; a better, more complete service; or valid recommendations for your specific job requirements . . . you'll find the answers at P&W. Take advantage of Pratt & Whitney's long experience in supplying Industry's gage block needs. Use the coupon below to send for complete information.

*First Choice* *for Accuracy*

## PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

18 Charter Oak Blvd., West Hartford 1, Connecticut  
Please send my free copies of Circular No. 532-1 and No. 545 describing P&W Steel and Solid Carbide Gage Blocks.

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CO. ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

MACHINE TOOLS • CUTTING TOOLS • GAGES

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Use the **BALL** with the **ARMORED HEART**\*

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- # It's PRECISION MADE and held to tolerances of .0001 inches.
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\* Only Abbott makes the Ball with the Armored Heart—the carbon steel bearing ball which is DEEP HARDENED and TEMPERED for maximum life, shock resistance and load-carrying ability.

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DIE-CUTTING PROBLEMS  
WITH RICHARDS' "TOUGH TEMPER"  
STEEL RULE CUTTING DIES

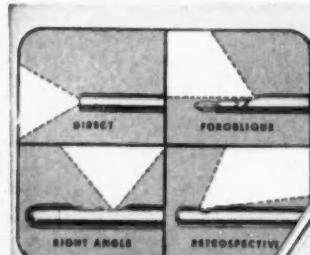
HEADQUARTERS SINCE 1900  
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FELT, INSULATION, SEATING, CORK,  
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for close-up visual inspection  
of internal surfaces  
and hidden parts



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**Van Huffel  
cold formed metal shapes and  
tubing simplify design  
and cut production costs  
for the makers of**

ANGLES & CHANNELS

LOCK SEAM TUBING

TIGHT & OPEN SEAM

WELDED TUBING

# farm equipment

No matter what you make that farmers use, chances are Van Huffel Cold Formed Metal Shapes and Tubing can help you make it faster, cheaper and better.

Faster because cold formed parts require very little or no machining; parts come to you shaped, cut, punched, or bent to your specifications.

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Better because of the wider latitude in choice of materials, design possibilities and fabrication methods. Shapes and tubing can be produced in Cold Rolled, Hot Rolled and High Tensile Steels. Van Huffel cold forms strip metals 1/2" to 33" wide; regular and irregular shapes in .018 to .312 gauge; tubing from 3/16" to 6" in diameter in any lengths.

Write today for free portfolio of cost reducing ideas that have taken shape in the farm equipment field.

**Van Huffel**

TUBE CORPORATION • WARREN, OHIO

Where ideas  take shape  
for makers of farm equipment

# Index to Advertisers

A	
Abbott Ball Co.	130
Acadia Div., Western Felt Works	134
Ace Drill Bushing Co.	134
American Broach & Machine Co.	27
American Cystoscope Makers, Inc.	130
American Steel & Wire Div.	120-121
Armstrong Cork Co.	7
Automotive Gear Works, Inc.	43
Avco Mfg. Co. (Lycoming Div.)	45

B	
Babcock & Wilcox Co.	42
Baird Machine Co., The	76
Barnes Co., W. F. & John	126-127
Bearings Co. of America	29
Bendix Aviation Corporation Products Div.	30
Bethlehem Steel Co.	107
Black & Decker Mfg. Co.	97
Blood Bros. Machine Div.	123
Brown Corp., The	108
Builders Steel Supply Co.	134
Bullard Company, The	11

C	
Chandler-Evans Div., Niles-Bement-Pond Co.	22-23
Chandler Products Corp.	116
Cincinnati Milling Machine Co.	32
Columbia-Geneva Steel Div.	120-121
Continental Tool Works Div.	119
Copperweld Steel Co.	91
Cotta Transmission Co.	1
Cross Co.	12

D	
Danly Machine Specialties, Inc.	9
du Pont de Nemours & Co., Inc., E. I.	105
E	
Eaton Manufacturing Co.	17-17
Ex-Cell-O Corp. (Continental Tool Works Div.)	119
F	
Fairchild Aircraft Div.	110
Federal-Mogul Corp.	29
Fellows Gear Shaper Co., The	134
G	
General Controls	103
Gisholt Machine Co.	93
Gits Bros. Mfg. Co.	111
Goodrich Chemical Co., B. F.	24
Goodyear Tire & Rubber Co. (Auto- motive Products Dept.)	15

This Advertisers' Index is published as a convenience, and not as part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert.

O	
Ohio Seamless Tube Div.	78

P	
Perfect Circle Corp.	95
Pittsburgh Plug & Products Co.	134
Pratt & Whitney Div., Niles-Bement-Pond Co.	128-129

R	
Reynolds Metals Co.	26
Richards Co., J. A.	130
Rogers Corp.	101

S	
Schwitzer-Cummins Co.	73
Shuler Axle Co., Inc.	Back Cover
Simmons Fastener Corp.	6
Snyder Tool & Engineering Co.	75
Standard Oil Co. (Ind.)	2nd Cover
Standard Pressed Steel Co.	28
Sterling Aluminum Products, Inc.	99
Subscription Post-Card	88
Sun Oil Company	8
Sundstrand Machine Tool Co.	112-113
Synchro-Start Products, Inc.	134

T	
Tennessee Coal & Iron Div.	120-121
Texas Company, The	4
Townsend Co.	104
Tuthill Pump Co.	122
Tuthill Spring Co.	130

U	
United States Steel Corp.	120-121
United States Steel Supply Div.	74
Upholstery Leather Group, Inc.	109

V	
V & O Press Co.	125
Van Huffel Tube Corp.	131

W	
Waldes Kohinoor, Inc.	13
Western Felt Works	134
Wood Co., R. D.	21
Wyman-Gordon	16

Y	
Young Radiator Co.	115
Z	
Zollner Machine Works	3rd Cover

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# GENERAL MOTORS

## on your 50-millionth car

Even in a nation accustomed to the big . . . the unusual . . . the outstanding, this is an important milestone of progress. Its celebration is typically American and a tribute to the enterprise, ingenuity, and cooperation of thousands of Americans. We at La Salle are proud of our association with this great organization. We give a snappy salute and a crisp "Well done!" to the men and women of General Motors and its dealers everywhere.

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LARGEST DELIVERABLE STOCKS ANYWHERE



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8151 N. RIDGEWAY AVE. • SKOKIE, ILLINOIS

See our full page "ad" in the STATISTICAL ISSUE p. 399



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MACHINES AND TOOLS FOR  
**GEAR PRODUCTION**  
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**SPECIAL OFFER**  
50 NET TON 12# A.S.C.E. NEW RAILS  
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INDUSTRIES**

Penetrates into Leading Plants  
in the  
Automotive and Aircraft Industries

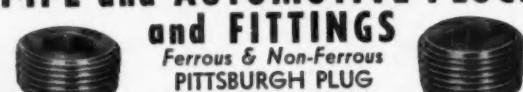


You'll find a heavy-duty clutch  
to fit your needs in the com-  
plete Lipe line.

**Lipe-Rollway Corporation**  
SYRACUSE, N. Y.

**PIPE and AUTOMOTIVE PLUGS  
and FITTINGS**  
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## Sensational Piston Performance

# UNIFORM CLEARANCE AT ALL TEMPERATURES

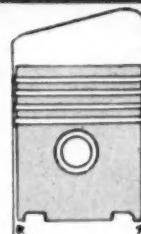
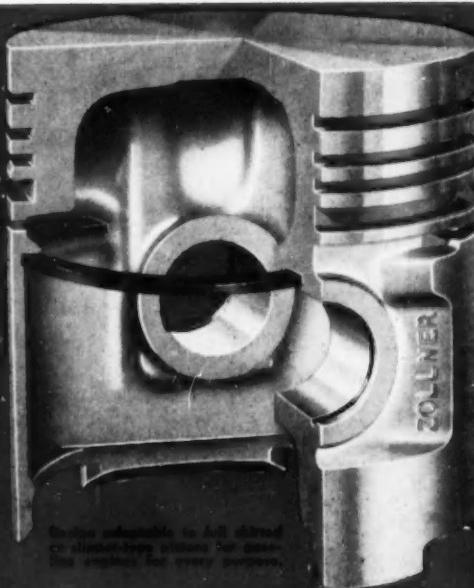
### STEEL TENSION MEMBER

Anchored only at pin bosses  
and cast in positive contact  
with I. D. of piston skirt

Controls Clearance Automatically

### ZOLLNER CLEAR-O-MATIC PISTONS

Now, pistons may be fitted to closer clearances than ever before possible. The sensational development of CLEAR-O-MATIC Pistons by Zollner engineers reduces required clearance to less than .001 with constant uniformity of skirt bearing over the entire temperature range. Performance results are spectacular. Engines run quietly with no cold slap. Friction is reduced without loss of durability or heat conductivity. There is no danger of scuffing or seizing. The Zollner designed steel tension member incorporates in the aluminum piston the same effective expansion as the ferrous cylinder itself. We urge your immediate test of these sensational advantages for your engine.



UNIFORM  
EFFECTIVE SKIRT  
CLEARANCE  
AT ALL  
TEMPERATURES

- 1 Clearance maintained uniformly at all coolant temperatures from 20° below zero to 200° F.
- 2 Effective expansion identical with ferrous cylinder.
- 3 Steel tension member, with same effective expansion as cylinder, maintains uniform skirt clearance through entire temperature range.
- 4 Normal diametric clearance usually less than .001 with uniform skirt bearing.
- 5 Durability and conductivity comparable to heavy duty design.

ZOLLNER

THE ORIGINAL EQUIPMENT PISTONS

PISTONS

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ADVANCED  
ENGINEERING

PRECISION  
PRODUCTION

In cooperation with  
engine builders

# LOOK what these new **SHULER BRAKES** offer you!

READ the facts about the new Shuler-Axle-Company brakes, and you'll instantly realize that they are exactly what you have been looking for.

Top quality brakes with positive malleable-iron brake shoes are obviously slightly heavier than lesser products. Remember, however, that when used with Shuler One-Piece Tubular Axles, the entire assembly actually weighs less than "competition".

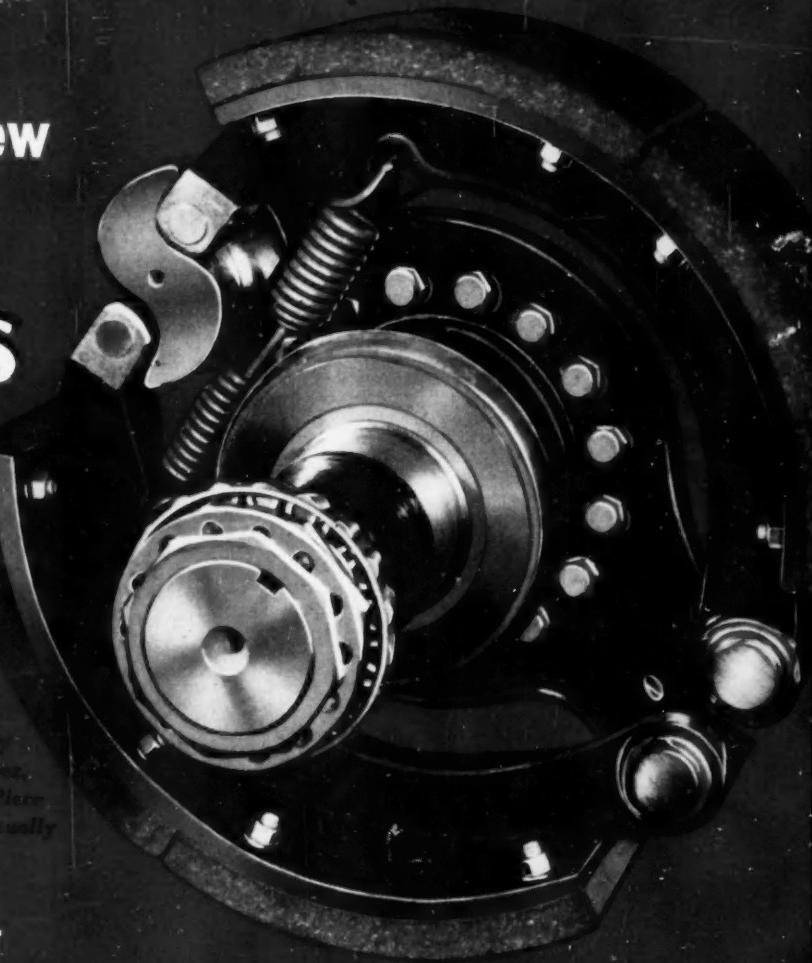
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- 1 New light-weight but permanent malleable brake shoes and spiders.
- 2 Brakes are bolted (not riveted) to axle flanges.
- 3 Roller shafts are fitted into the shoes with precision-machining, to insure full bearing, and are then locked in place. They can't fall out.
- 4 Positive locking "ball pins" in the anchor pins.
- 5 Parkerized and hardened case rollers for rust-proofing and long service.
- 6 Nylon inner and outer cam-shaft bushings.
- 7 Self-aligning "ball and socket" aluminum cam-shaft bearings.

**NEW HEAVY-DUTY U-TYPE BRAKE DESIGNED ESPECIALLY FOR THE WEST COAST** has all the above features plus longer anchor pins with double bearing surface, and larger diameter case rollers for unusually severe service.

**SHULER AXLE COMPANY, Incorporated, LOUISVILLE, KENTUCKY**  
SUBSIDIARY OF FULLER MANUFACTURING COMPANY  
SALES OFFICES in DETROIT, CHICAGO, OAKLAND and TULSA  
WEST COAST WAREHOUSE  
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SOUTHWEST WAREHOUSE  
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## Plus THICKER, BETTER, REPLACEABLE LININGS THAT CAN'T PULL OFF

Inspection will show you why Shuler brake linings never pull off—they're bolted on! Other advantages:

- 1 Uniform brake-lining wear is insured by precision machining of the brake-shoe contours.
- 2 Brake linings are full  $\frac{3}{8}$ " thick, all around—not just at the center.
- 3 The malleable brake shoes are permanent. They do not distort as the linings wear down. When linings wear out, you just bolt on new linings.
- 4 Additional lining area is provided by covering the entire length of the brake shoe, and by plugging all 28 holes filled with friction material, at the factory. Many other unique improvements too.

Shuler Axle Company  
2920 Second Street, Louisville, Kentucky

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